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(71) Applicant (for all designated States except US): **RENAISSANCE LEARNING, INC.** [US/US]; 2911 Peach Street, Wisconsin Rapids, WI 54494 (US).

(71) Applicant and

(72) Inventor: **ZWART, Dale, R.** [US/US]; 9154 W. Coco Drive, Littleton, CO 80128 (US).

(74) Agents: **BAXTER, William, K. et al.**; Godfrey & Kahn, S.C., 780 North Water Street, Milwaukee, WI 53202-3590 (US).

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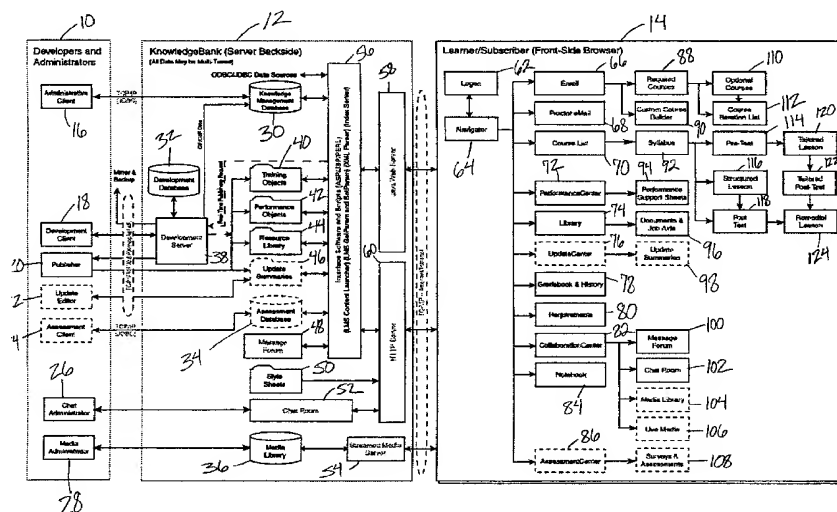
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(54) Title: **TRAINING AND KNOWLEDGE MANAGEMENT SYSTEM**



(57) Abstract: A training and knowledge management system is used to create, edit, deliver, maintain, and manage complex computer-based training systems. The core system includes a development module for developing training founded on competency-based adult learning theory, a publisher module for producing electronic and hard copies, a distance learning module to provide training over the internet and intranet, and a management module to provide full management capabilities. The integrated enterprise-wide software training system utilizes learning objects (40) to create tailored learning for organizations and individuals. The system supports all types of training, including web-based, intranet, instructor-led, or CD-ROM. The dynamic learning objects include the course, the module, the unit, the competency, the media, and the measurement. The learning objects dramatically reduce the cost of developing, publishing, and revising training content.

TRAINING AND KNOWLEDGE MANAGEMENT SYSTEM

Cross-Reference to Related Applications

This application claims the benefit of U.S. Provisional Application No. 60/159,398, filed October 14, 1999.

5 Field of the Invention

The present invention relates generally to training and knowledge management, and more particularly to an integrated training and knowledge management system to be used for computer-based training.

Background of the Invention

10 Training and knowledge management plays an important role in successful organizations. Many of the most successful organizations credit their success directly to the skill and productivity of their workforce. Great care is taken to match the right person to each position, and then to ensure that he or she is armed with the specific tools, training, and support necessary to accomplish assignments. Employees need specific training and knowledge to meet the exact
15 needs of their position in an organization.

Most large sophisticated organizations that rely heavily on computers to develop their own computer-based training, or purchase training software for specific training needs. This can be a very expensive proposition. The organization must either employ a full-time training staff to develop new training software and implement the training, or outlay large sums of money to
20 purchase commercial training software. Most training software is usually structured to a specific subject or course. Thus, new training software must continually be developed or purchased in order to provide new training courses.

Therefore, there is a need for a computer-based training and knowledge management system that may be used to create, edit, deliver, maintain, and manage complex training systems. The training system is preferably flexible enough to support all types of training including web-based internet, intranet, print, instructor-led, or CD-ROM, and preferably dynamic enough to enable tailored learning for each individual. The present invention provides such a training and knowledge management system. The present invention helps organizations develop and deliver customized computer-based training to their employees and customers using dynamic learning object technology to integrate learning, knowledge management, and performance support.

Summary of the Invention

The training and knowledge management system of the present invention is used to create, edit, deliver, maintain, and manage complex training and knowledge management systems. Under this system, the user develops training programs based on proven concepts of Instructional Systems Development (ISD). The system design is based on the ISD process, providing efficiency in its ability to reuse information. This allows the development process to be streamlined and to provide a high degree of flexibility in all training modules.

This integrated enterprise-wide system preferably supports all types of training including web-based, intranet, instructor-led, or CD-ROM. The system uses a dynamic learning object technology to integrate learning, knowledge management, and performance support. The system incorporates dynamic “learning objects” that dramatically reduce the cost of developing, publishing, and revising training content, and enables tailored learning.

The system’s “learning objects,” allow training curricula to be tailored to a specific course or individual. thus permitting an organization to produce both employee and customer

training materials from a single data source. Preferably, the system instantly tailors the training materials for each user. In addition, a user receives instant feedback and has easy access to the student training records. The system database provides web-based, traditional, and CD-ROM-based training materials, and can also be the source of an organization's policies, procedures, and
5 practices used to support an enterprise wide electronic performance support system.

The training and knowledge management system of the present invention is a client server, open architecture system that preferably consists of at least five integrated modules, the development module, the publisher module, the distance learning module, the management module, and the extended learning system modules.

10 The development module is the front end of the database and the entryway into the system. This module is used to create and edit the training course structure, and develop learning objects to be included in the training courses. The learning objects are stored in a database and are available enterprise-wide for inclusion in courses, documents, and a performance support system. The learning objects can be assembled and reconfigured rapidly to meet the needs of
15 both the individual learner and the organization. At the top of the learning object hierarchy, is the course. The course consists of modules, units, competencies, instructional media, and knowledge and performance measurements.

The publisher module retrieves data from the database to produce printed and electronic training and user documentation. The publisher module is where learning objects are
20 dynamically compiled and then produced or published for the student. There are two types of documents available from the publisher module; these are printed documents and web-based documents.

The distance learning module connects the learner to the data. The learner can access the system through any standard web browser without using proprietary software or plug-ins. Through a customized personal web page, each remote learner accesses the system to participate in training. Each remote learner's page connects to the system to access information from the development module, management module, and other modules needed to complete training.

The distance learning module provides students with access to courses, electronic reference materials, and message forms for sharing ideas with subject matter experts and other learners who are participating in the same course. The distance learning module allows each student to take a pre-test before starting an instructional module. The distance learning module then automatically scores the test and creates a tailored learning unit. This is not simply a list of topics to be reviewed, but an actual tailored learning experience. The system automatically gathers the necessary learning objects and assembles them into a customized lesson. A learner can also choose to follow a pre-defined path through the course of instruction. At the end of each module, the learner is presented with a post-test. The post-test can include both knowledge based questions and simulation based performance measurements. The post-test evaluates how well the learner has mastered the learning objectives and identifies where remedial instruction may be needed. At this point, the system will automatically gather the necessary learning objects to fill in the learning gaps. But rather than simply presenting the same material over again, the system can shift the learning mode from visual, to audio, to tactile, or to exercise based media.

The management module provides complete record keeping and scheduling for an entire organization. It captures student training history, maintains grade books, preserves learning profiles, and provides training completion reports. The management module is designed to be

flexible by providing an interface to an organization's existing human resource and training databases.

The extended learning module provides additional capabilities through additional modules. A performance support module provides an indexed search function, which gives users
5 access to the entire relational database of learning objects and information. An assessment module allows a user to create custom, front-end assessments that can be delivered over the web or converted to other formats. A library module serves as a central repository for the knowledge of the enterprise. An update module allows a user to change or update a learning object and send the information to those who need it. A collaboration module integrates individual learning with
10 live, technology-supported interactions.

Employees and customers can receive instant access to learning materials that are truly tailored to meet their needs and their learning styles. The open architecture of the system and compliance with emerging international standards provides a system that permits an organization to use most of its existing electronic training materials.

15 Various other features, objects, and advantages of the invention will be made apparent to those skilled in the art from the following drawings and detailed description of the invention.

Breif Description of the Drawings

FIG. 1 is an overall block diagram of the training system software architecture;

FIG. 2 is a schematic diagram of the learning object model hierarchy of the development
20 module;

FIG. 3 is a top level flow diagram of the core modules within the training system;

FIG. 4 is a flow diagram of the development module of the training system;

FIG. 4A is a flow diagram depicting the adding of a new course to the development module;

FIG. 4B is a flow diagram depicting the adding of a new module to the development module;

5 FIG. 4C is a flow diagram depicting the adding of a new unit to the development module;

FIG. 4D is a flow diagram depicting the adding of a new competency to the development module;

FIG. 4E is a flow diagram depicting the adding of a new media to the development module;

10 FIG. 4F is a flow diagram depicting the adding of a new measurement to the development module;

FIG. 5 is a flow diagram of the publisher module of the training system;

FIG. 5A is a flow diagram of the report generator of the publisher module;

FIG. 5B is a flow diagram of the classroom material generator of the publisher module;

15 FIG. 5C is a flow diagram of the document generator of the publisher module;

FIG. 5D is a flow diagram of the distance learning generator of the publisher module;

FIG. 5E is a flow diagram of a subroutine of the distance learning generator;

FIG. 5F is a flow diagram of a subroutine within the subroutine of Fig. 5E;

FIG. 6 is a flow diagram of the distance learning module of the training system;

20 FIG. 6A is a flow diagram of the logon portion of the distance learning module;

FIG. 6B is a flow diagram of the open course portion of the distance learning module;

FIG. 6C is a flow diagram of the select test portion of the distance learning module;

FIG. 6D is a flow diagram of the select tutorial portion of the distance learning module;

FIG. 6E is a flow diagram of the grade book retrieval portion of the distance learning module;

FIG. 6F is a flow diagram of the notebook retrieval portion of the distance learning module;

5 FIG. 6G is a flow diagram of the course enrollment portion of the distance learning module;

FIG. 7 is a flow diagram of the management module of the training system;

FIG. 8A-8M are tables that illustrate the structure of the development module database;

FIG. 9A-9R are tables that illustrate the structure of the management module database;

10 FIG. 10 is a flow diagram of the update center process for the development, management and distance learning modules;

FIG. 11 is a table of update history fields in the management and development modules;

FIG. 12 is a screen example of the development module change summary;

FIG. 13 is a table listing the data elements of the update history database;

15 FIG. 14 is a flow diagram of the update center development module process;

FIG. 15 is a table listing of exception handling;

FIG. 16 is a table listing the data fields added to the management module database;

FIG. 17 is a listing of the changed fields associated with the course ID;

20 FIG. 18 is a flow diagram of the performance support center process for the development, management and distance learning modules;

FIG. 19 is a flow diagram of the performance center process in the distance learning module;

FIG. 20 is a screen example of the development module competency; and

FIG. 21 is a table of performance support fields in the management and development modules.

Detailed Description of the Invention

The training system is an integrated, enterprise-wide system that supports most, if not all learning formats including web-based, intranet, instructor-led, print and/or CD-ROM learning through the use of dynamic learning objectives which dramatically reduces the cost of developing, publishing, and revising training content and enables tailored learning to meet the individual needs of each student.

FIG. 1 illustrates an overall block diagram of the training system's integrated system architecture. The architecture consists of three domains. The domains include the developers and administrators domain 10, the knowledge bank or server domain 12, and the learner/subscriber domain 14. The system architecture allows for data distribution within the knowledge bank domain 12, and transactional distribution in the developers and administrators domain 10.

The developers and administrators domain 10 consists of clients which use TCP/IP/IPX/SPX AppleTalk, or Microsoft Networking protocols to access data files located in the knowledge bank domain 12. The clients are used to access data and execute stored procedures on a data server located in the knowledge bank domain 12. Developers and administrators access the databases on the knowledge bank and perform database operations such as adding data, generating reports, etc. The client and knowledge bank domain share the same interface tools, the same language, and the same information management system.

The developers and administrators clients include an administrative client 16, a development client 18, a publisher 20, an update editor 22, an assessment client 24, a chat administrator 26, and a media administrator 28. The administrative client 16 provides access to the knowledge management database 30 in the knowledge bank domain 12. The development
5 client 18 provides access to the object methods and attributes of the development database 32 in the knowledge bank domain 12. The development client 18 is principally used to create, edit, and review training and performance support content. The publisher 20 provides access to the object methods used to assemble training content into a usable product. The update editor 22 is used to update training summaries. The assessment client 24 provides access to the assessment
10 database 34 in the knowledge bank domain 12.

The knowledge bank domain 12 is a multi-user, cross-platform data and application server for the system's learning objects. The knowledge bank domain 12 allows developers and administrators to access user databases and custom applications in a client/server architecture. The knowledge bank domain 12 provides development tools, full scalability, data security, and
15 connectivity options for enterprise systems. The knowledge bank domain 12 also provides a completely integrated architecture where both client and server use a single application.

The knowledge bank domain 12 includes a knowledge management database 30, a development database 32, an assessment database 34, and a media library 36. The knowledge bank domain 12 also includes a development server 38, training objects 40, performance objects
20 42, a resource library 44, update summaries 46, style sheets 50, a chat room 52, a message forum 48, a software and scripts interface 56, a Java Web server 58, and an HTTP server 60.

The training objects 40 are defined as any digital entity that can be used, reused or referenced during supported learning. Examples of supported learning include computer-based training, distance learning, and collaborative learning. Examples of training objects include multi-media content, instructional content, learning objectives, instructional software, and software tools that support learning. The training objects 40 are used to assemble structured learning, tailored learning, and remedial learning lessons.

The performance objects 42 are defined as any digital entity that can be used, reused, or referenced to a support job performance. Examples of support job performance include electronic performance support, electronic knowledge management, and online procedural referencing. Examples of performance objects 42 include multi-media content, procedures, and information that supports a major competency of task performance

****The resource library 44 consists of a data repository for electronic documentation, and an index of external documents as defined by a system administrator. The documents contained in or identified in the resource library 44 are accessible by structured and tailored lessons in the learner domain.**

The chat room 52 and message forum 48 provides an environment for collaboration between students, content experts, instructors, and/or other students. ****

The interface software and scripts 56 controls access to training content and administrative data. The interface software and scripts 56 control the following functions: logon, training navigator creation, course syllabus creation, course enrollment, system registration, course directory creation, resource library searching, chat and message forum access, email, help retrieval, training object assembly, performance object search and catalog, notebook save and

recovery, grade book recovery, redirection to assembled training content, MIME typing and mapping of assembled content, and XML object tagging and parsing.

The HTTP server 60 may be any server that supports common bindings to HTTP for learning technology services. The server 60 preferably supports common URL suffixes, HTTP
5 commands, and/or HTTP post-body contents that correspond to common learning technology services available through web servers. The server 60 provides an interface between the learner domain and the server domain via encoded post-body contents and user IDs.

The learner/subscriber domain 14 includes a log-on page 62 which allows a learner to submit a user ID and password with a request for admission to the learning environment. On
10 successful log-on, the server assembles a navigator page 64 for the learner to enter the training center. The navigator 64 is the central control point for the learner. Navigation options include: enrollment 66, *** open grade book, enrollment, directory of courses currently enrolled, open notebook, enter chat room, and enter message forum. When a learner selects a course from the directory of courses on the navigator page, the server assembles a syllabus page from the training
15 objects database. The syllabus provides an outline of the course, including pre-tests, post-tests, and structured lessons. When a learner selects a pre-test from the course syllabus, the server assembles a pre-test from the training objects database. Structured lessons are assembled when requested from a course syllabus page. When a learner selects a post-test from a course syllabus, the server assembles a post-test from the training objects database.

20 Upon receipt of a pre or post-test, the system automatically scores the test, identifies the competencies associated with incorrect answers, and assembles a tailored lesson using learning objects found in the training objects database.

Upon receipt of a request for performance support sheets, the server assembles a directory and search page for performance object files contained in the performance objects data store 42.

Upon receipt of a request for learning resources, the server assembles a search page for
5 training resources contained in the resource library data store.

FIG. 2 illustrates the learning object model hierarchy of the development module. The learning object hierarchy of the training system includes courses, modules, units, competencies, media, and measurement. A course is an arrangement of modules designed to instruct people in the competencies (skills and knowledge) required to perform specific units of work.

10 A unit can be instructor directed, self directed, distance learning, or practical application. The competencies of the unit are the discreet operations required to complete a unit of work. There are two domains for competencies, skills, and knowledge. Skills are discreet motor functions that contributes to the successful performance of a work unit. Knowledge is information or a cognitive action required when performing a work unit. Competencies are
15 listed by line number and in an indentured hierarchy. Subordinate competencies are set at a lower level and called competency elements.

The media allows the user to insert different types of visual, auditory, or tactile elements into a course. These types include a picture, a binary large object bit file (BLOB), an external media file, such as an animation, a Quick Time movie, etc.

20 Questions or measurements are used to measure mastery of competencies in the skill or knowledge domain. A test question will be linked to a competency.

FIG. 3 is a flow diagram of the core modules within the training system. These modules include the development module, the publisher module, the distance learning module, and the management module.

The development module is the front end to the database. The database is designed to manage and store each of the learning objects. The development module allows a training curriculum to be developed for competency-based learning, utilizing dynamic learning objects to create a tailored learning environment.

In the management module, a student table contains attributes that define the student's personal information. The student is also identified by a student ID. The management model also includes files of courses and other learning objects, courses, instances of a course, staff, organization, registration, billings, grade book, and events.

The distance learning module includes tutorials which are pre-compiled and stored in a NTFS directory. In addition, tests are pre-compiled measurements of a learning module. Each test is stored in an NTFS directory. Questions are pre-compiled, individual test questions related to a competency cluster. The individual questions are used for second tiered pre and post-testing. Clusters are pre-compiled competencies and the related elements of a learning unit. Each cluster is stored in a NTFS directory.

The publisher module retrieves data from the database to produce printed and electronic training and user documentation. There are two types of documents that are available in the publishing function of the software. These are printed documents and web based documents. The ability to print documents allows the user to have hard copy training manuals and student

and/or instructor textbooks. The ability to have web based documents allows the user to customize courses for online training.

FIG. 4 is a flow diagram of the development module. This diagram illustrates how to create a course curricula using the development module of the training system software of the present invention. The curriculum is developed in the development module through a number of templates in which new course information, new module information, new unit information, new competency information, new media information, and new measurement information is input into the development module. FIGS. 4A-4F illustrate the details of entering this data.

FIGS. 4A-4F show flow diagrams for creating a course curriculum with the development module. In FIG. 4A, new course information is entered into the development module. The information includes course title, course number, online introduction, document introduction, classroom introduction, the publisher's name and address, and the copyright owner's name and address. As mentioned above, all of the course components are entered into the system under the course template.

FIG. 4B illustrates a similar method of inserting module information. The module information to be entered into the system includes the module title, the module number, the sequence number, the author, the distribution attributes, the document introduction, the classroom introduction, the learning objective, the training area description, the pre-test instructions, and the post-test instructions. Modules can be used to group information for instructor directed learning, self directed learning, distance learning, practical exercise, testing, or textbook learning. A module is a section of a course that includes a group of related units.

You can think of a module as a group of individual tasks that might be taught in a lesson, or a grouping of related information that would be covered in a chapter of a user's manual.

FIG. 4C illustrates the full diagram for entering new unit information into the system. A unit is a clearly defined and a measurable activity accomplished by individuals. It is the lowest behavioral level in the job or subject that is performed for its own sake. The unit's title, catalog entry, language, author, distribution attributes, document introduction, classroom introduction, online introduction, instructor notes, and learning objective are input into the development module.

FIG. 4D shows a full diagram for entering new competency data into the system. The competency is a major learning activity that enables a person to complete a task or conduct a measurable unit of work. A competency generally consists of skills and knowledge which contribute to the performance of the learning unit. A statement or description of the desired competency is input. The order in which the competency appears in the training material or documentation is also input. A verb describing the type of behavior is input. The instructional domain is automatically assigned upon selection of a performance verb. The domain level with a taxonomy is automatically assigned upon selection of a performance verb. A detailed description of a competency is also included. Other competency elements in the system include performance support, distribution attributes, training time, index entries, metatags, instructor notes, enabling learning objectives, performance standards, notices, warnings, equipment/tools, references and consumable supplies.

FIG. 4E illustrates the flow for entering new media information into the system. A description of the media and the order in which a particular media record would be used by a

competency or competency element is input; the learning mode, the delivery order, the credit, the caption, and a media type is selected. The media types typically include a picture, a binary large object bit file (BLOB), an external media file (animated GIF quick time movie) or a hypertext mark-up language (HTML) file. The last data to be input into the development module is new
5 measurement data. This data includes a topic or a short statement describing the related subject, a question type such as multiple choice, essay or fill in the blank.

FIG. 5 is a flow diagram of the publisher module of the training system. Fig. 5 illustrates the type of documents or reports that can be generated using the publisher module.

FIGS. 5A-5F illustrate the flow diagrams of the various generators of the publisher
10 module. The first type of report is published from a report generator in which a course hierarchy report or a test question report may be generated as shown in Fig. 5A. A classroom materials generator can be used to develop and publish a lesson plan, a student guide, a test package, or a media package, as shown in Fig. 5B. Fig. 5C illustrates two different textbook type documents which can be created using the document generator of the publisher module. The distance
15 learning generator is used to publish distance learning type documents which may be used for web-based or CD-ROM-based training. The details of this document generation are illustrated in Fig. 5E and 5F. The distance learning generator allows a complete training package to be assembled, on the fly, for web-based training.

Fig. 6 is a flow diagram of the distance learning module of the training system. The
20 distance learning module is a connection between the training data and the user, or learner. The module dynamically assembles and distributes all pages, lessons, and interfaces when requested by the user. The module also controls learner assessments and sends assessment data back to the

personnel and performance database to track the learner's current knowledge base and their preferred learning style. This capability is the basis of the invention's ability to tailor the training experience specifically for the user.

Figs. 6A-6G show flow diagrams of the different portions of the distance learning
5 module. In this module, a user logs onto the system and a navigator is displayed on the screen. The individual selects a course from a list of courses, displays the syllabus of the course, and selects the course object. The individual may then take a pre-test, and based on the pre-test results, enter into the structured learning portion of the module with a post-test at the end. If the user is not interested in selecting a course, then a number of other options are available, such as
10 performance support, changing the summary, retrieving resources, retrieving a grade book, retrieving a notebook, enrolling, sending instructor email, and entering a chat room. These functions are illustrated in Figs. 6A-6G.

Fig. 7 is a flow diagram of the management module of the training system. The management module allows an administrator to list courses, list students, list staff, list
15 organizations, list iterations, list registrations, list profiles, list billings, list events, and list grades in the system. The courses are the definition of a training object. They define the location of the digital content, and the administrative information associated with the conduct of a training event. Staff tables are used to identify persons who either administer or support the administration of courses. Staff members may be assigned to support a particular iteration of a
20 course. An organization identifies an entity to which a student or staff member belongs. An iteration is an instance of a course. A course may have many concurrent iterations. A profile describes courses and other learning objects that may be prescribed for an individual student. Many courses may be contained in many profiles. Many profiles may be linked to many

students. The event log is used to track critical system events and errors. A grade book record contains an instance of a knowledge or performance test completion. A grade book record can belong to one student and one course iteration. A billing identifies a chargeable event belonging to a particular registration. A billing may belong to one registration record. A registration
5 identifies an instance of a student belonging to an iteration of a class. A registration may belong to one iteration. An iteration may have many registrations.

The tables of Figs. 8A-8M illustrate the structure of elements within the development module database.

The tables of Figs. 9A-9R illustrate the structure of elements within the management
10 module database.

Although the present invention has been described in detail, it should be understood that various changes, modifications, substitutions and alterations can be made without departing from the spirit and scope of the invention as described by the appended claims.

Claims

I claim:

1. A computer-based training system comprising:
 - a fully integrated technology platform that includes the ability to develop training curriculum, publish the curriculum in electronic and hard copy form, and manage distance learning and record keeping functions;
 - a development module on the front-end of a database, the database designed to manage and store a plurality of learning objects, the development module used to develop curriculum for the training system based on the plurality of learning objects;
 - a publisher module for automatically formatting the learning objects into usable products, the publisher generating hard copy and electronic training media;
 - a distance learning module to control the distribution of web-based training materials, to be viewed through standard web browsers, and to provide lesson pre-testing to support tailored learning, post-testing, and automatic tailored remediation learning;
 - a management module to provide record keeping and student tracing information, the management module interfacing with open system training and human resource;
 - wherein the system stores data within the development module database structurally in a way that allows the system to re-use the data, dynamically assemble the data, and synthesize the data into new forms; and
 - wherein distance learning module, a student's current knowledge is tracked, along with the student's preferred learning style, and the module assembles the learning material such that it is tailored for each individual.

2. The training system of claim 1 wherein a curriculum is developed using dynamic learning objects.

3. The training system of claim 1 wherein learning is tailored to each individual through pre-tests.

5 4. The training system of claim 1 wherein the system uses user friendly templates for developing curriculum.

5. The training system of claim 1 wherein the system publishes materials in any format such as on the internet, intranet, in print, or on CD-ROM.

10 6. The training system of claim 1 wherein the learning objects may be linked to multiple courses.

7. The training system of claim 1 wherein users can search the entire data base for a particular procedure or any piece of information.

8. The training system of claim 1 wherein the collaboration module includes direct email connectivity to every designated content expert.

15 9. The training system of claim 1 wherein the collaboration module includes chat rooms for live discussions.

10. The training system of claim 1 wherein the collaboration module includes message forums.

20 11. The training system of claim 1 wherein the collaboration module includes streaming media capabilities.

12. A computer-based training system comprising:

a fully integrated technology platform that includes the ability to develop training curriculum, publish the curriculum in electronic and hard copy form, and manage distance learning and record keeping functions;

5 a development module on the front-end of a database, the database designed to manage and store a plurality of learning objects, the development module used to develop curriculum for the training system based on the plurality of learning objects;

a publisher module for automatically formatting the learning objects into usable products, the publisher generating hard copy and electronic training media;

10 a distance learning module to control the distribution of web-based training materials, to be viewed through standard web browsers, and to provide lesson pre-testing to support tailored learning, post-testing, and automatic tailored remediation learning;

a management module to provide record keeping and student tracing information, the management module interfacing with open system training and human resource;

an extended learning module to provide extended capabilities;

15 wherein the system stores data within the development module database structurally in a way that allows the system to re-use the data, dynamically assemble the data, and synthesize the data into new forms; and

20 wherein distance learning module, a student's current knowledge is tracked, along with the student's preferred learning style, and the module assembles the learning material such that it is tailored for each individual.

13. The training system of claim 12 wherein the extended learning module includes a performance module.

14. The training system of claim 12 wherein the extended learning module includes an assessment module.

15. The training system of claim 12 wherein the extended learning module includes a library module.

5 16. The training system of claim 12 wherein the extended learning module includes an update module.

17. The training system of claim 12 wherein the extended learning module includes a collaboration module.

18. A computer-based training system comprising:

10 a fully integrated technology platform that includes the ability to develop training curriculum, publish the curriculum in electronic and hard copy form, and manage distance learning and record keeping functions;

a development module on the front-end of a database, the database designed to manage and store a plurality of learning objects, the development module used to develop curriculum for the training system based on the plurality of learning objects;

15 a publisher module for automatically formatting the learning objects into usable products, the publisher generating hard copy and electronic training media;

a distance learning module to control the distribution of web-based training materials, to be viewed through standard web browsers, and to provide lesson pre-testing to support tailored learning, post-testing, and automatic tailored remediation learning; and

20 a management module to provide record keeping and student tracing information, the management module interfacing with open system training and human resource.

19. The training system of claim 18 further comprising an extended learning module.

20. The training system of claim 19 wherein the extended learning module includes a performance module.

21. The training system of claim 19 wherein the extended learning module includes an assessment module.

5 22. The training system of claim 19 wherein the extended learning module includes a library module.

23. The training system of claim 19 wherein the extended learning module includes an update module.

10 24. The training system of claim 19 wherein the extended learning module includes a collaboration module.

7158

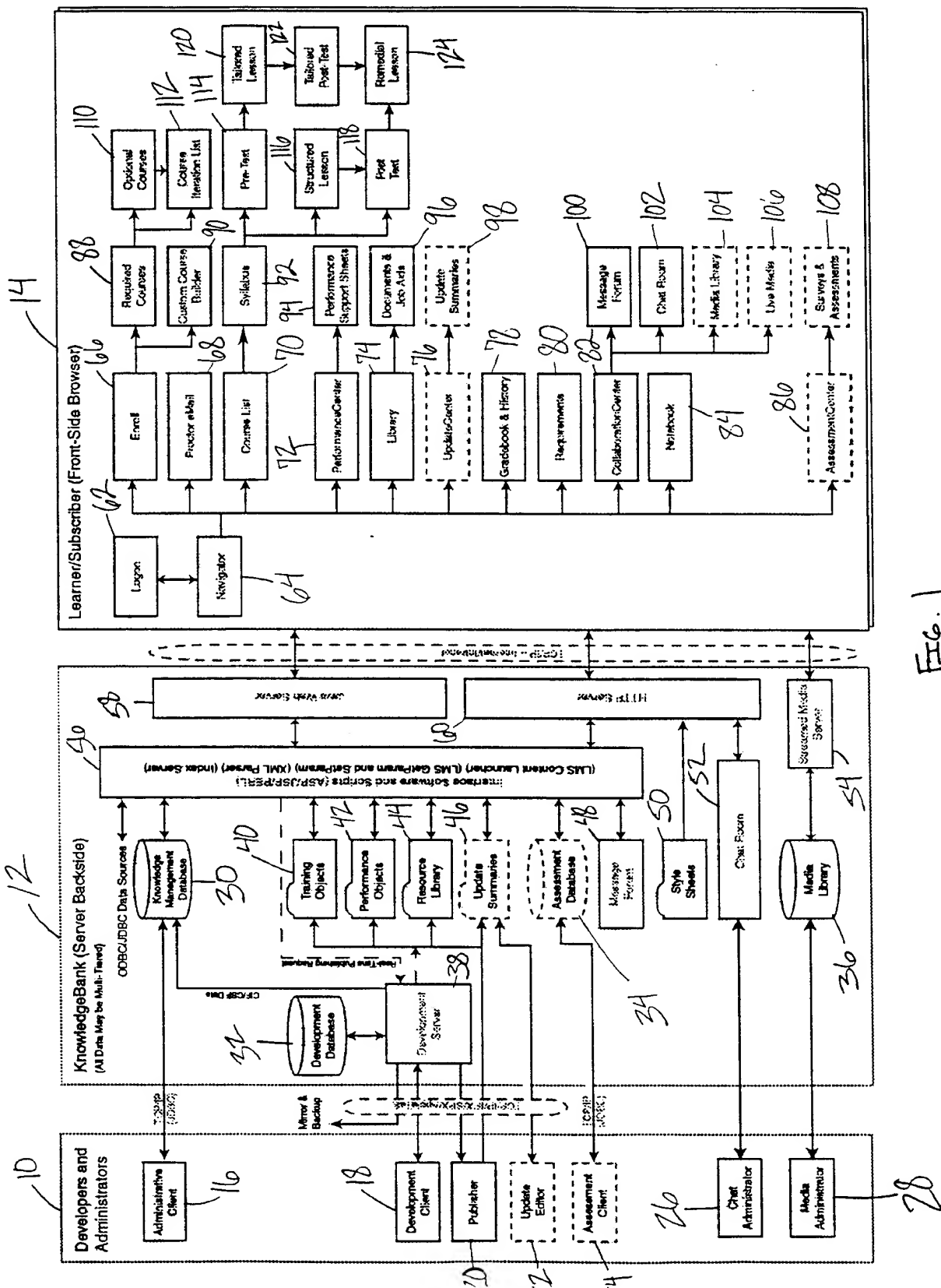


Fig. 1

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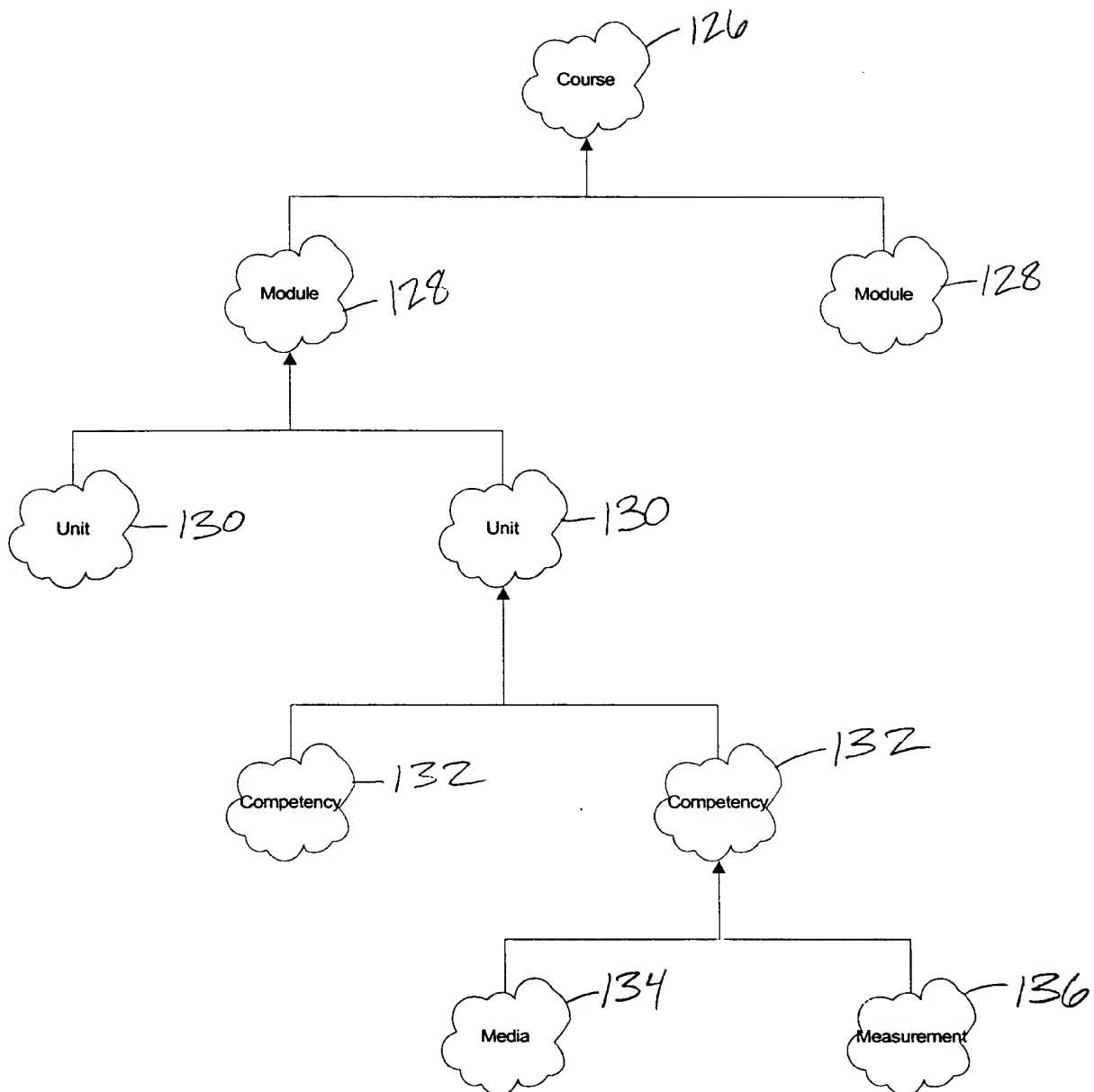


FIG. 2

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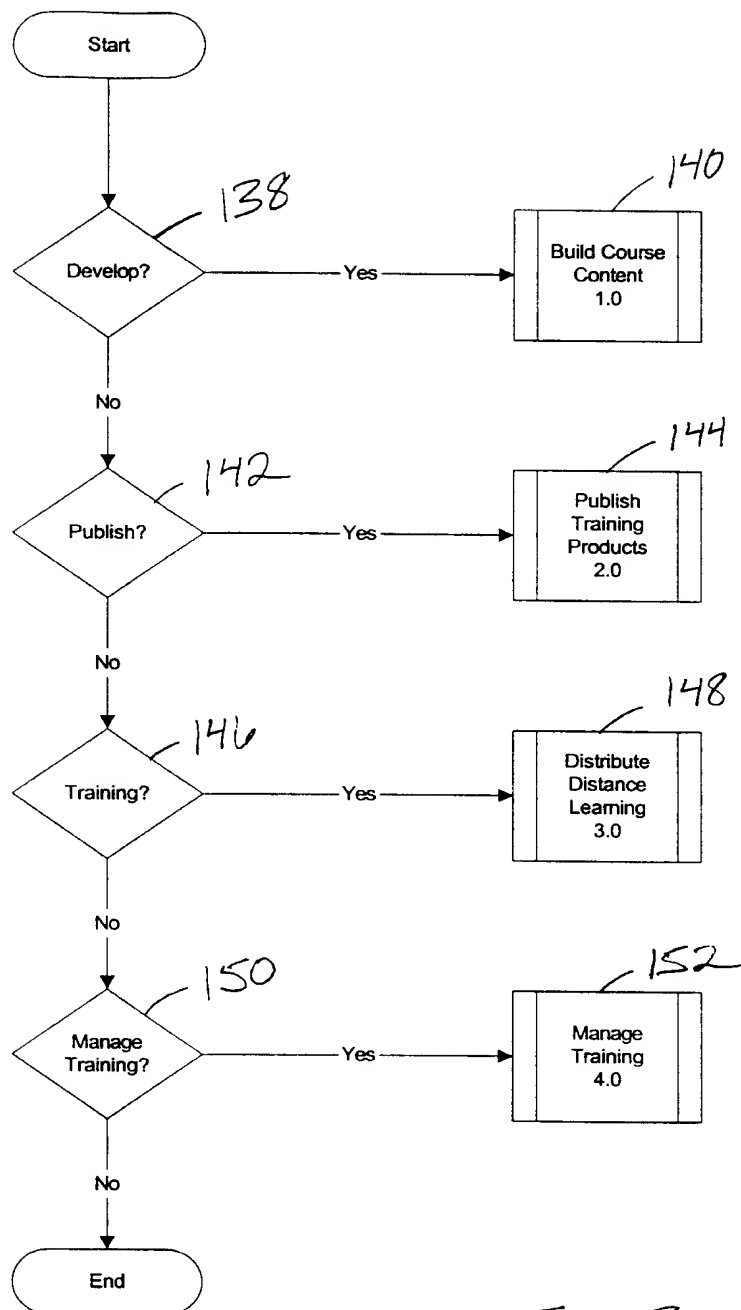


FIG. 3

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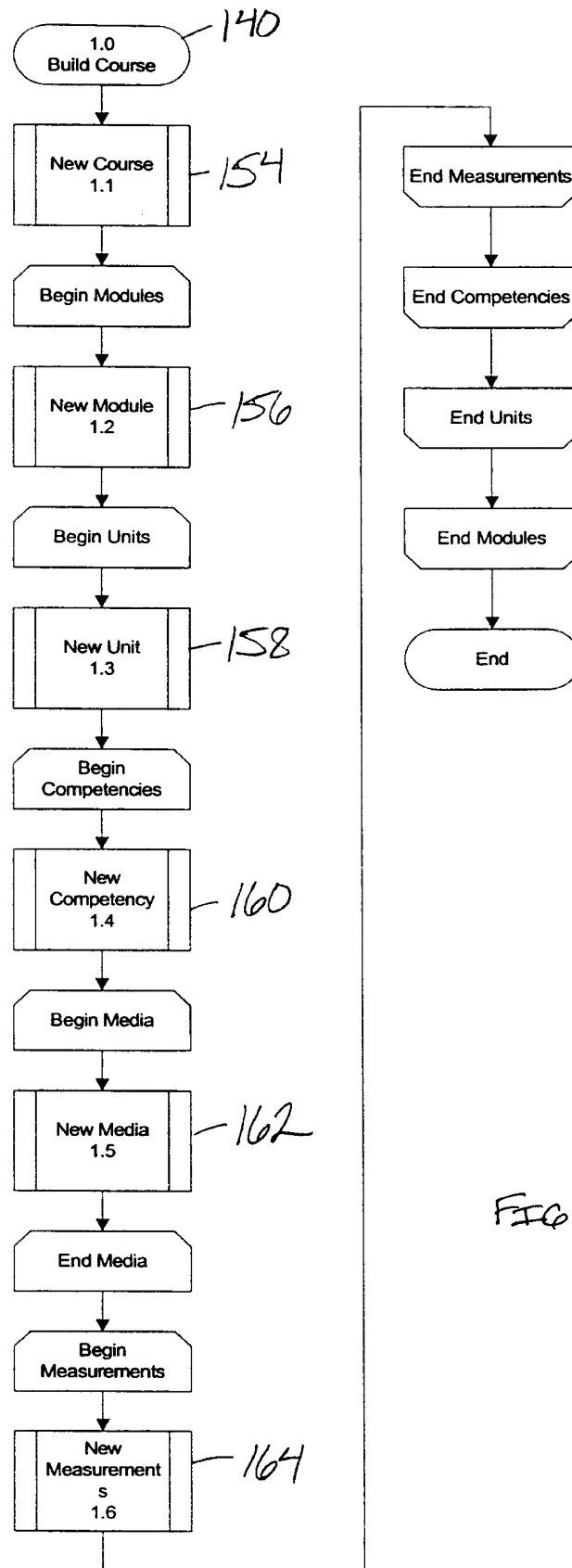


FIG. 4

5158

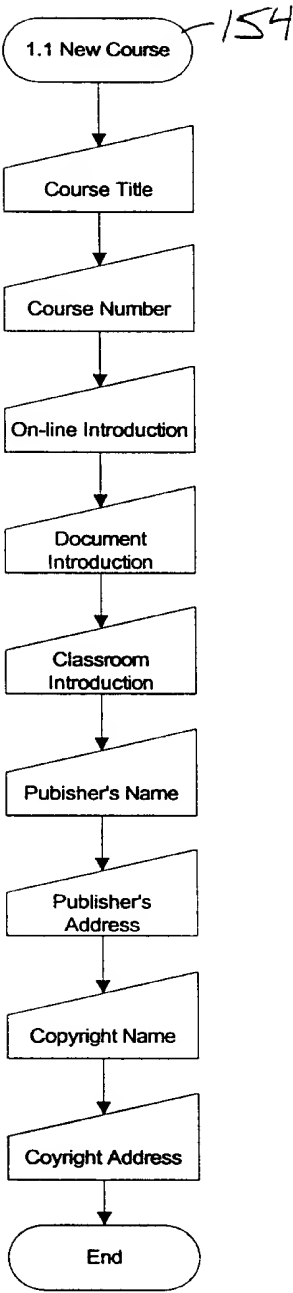


FIG. 4A

6158

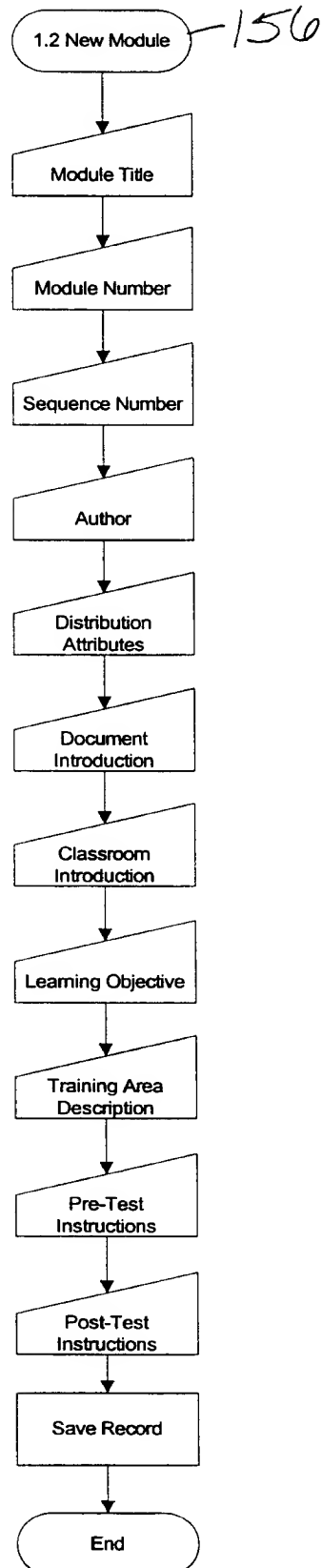


FIG. 4B

7158

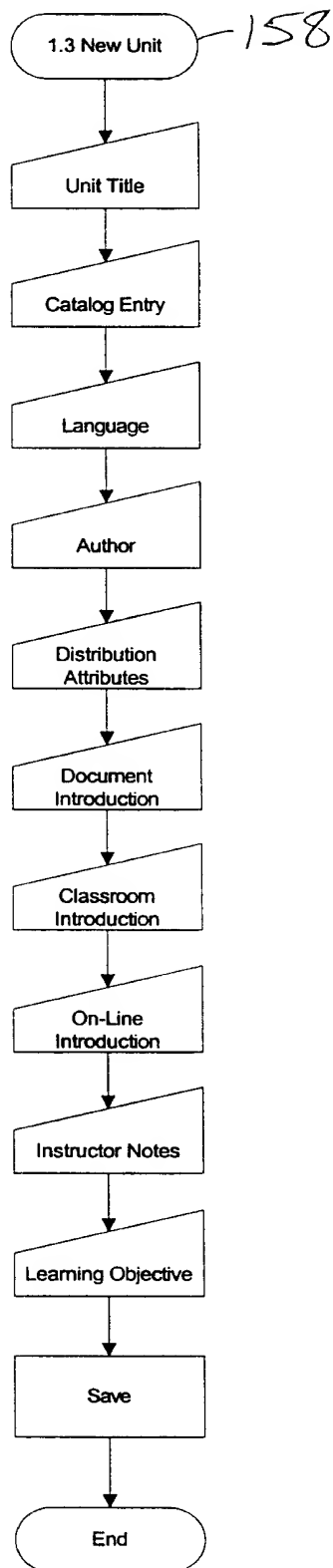


FIG. 4C

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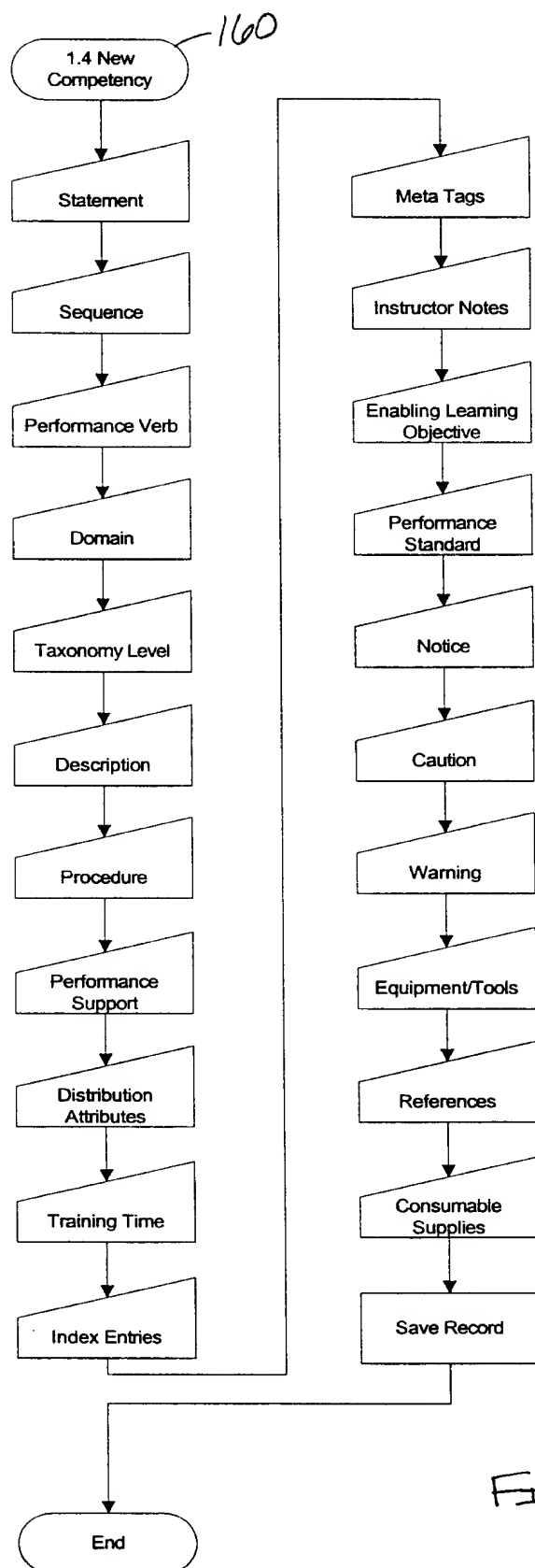


FIG. 4D

9158

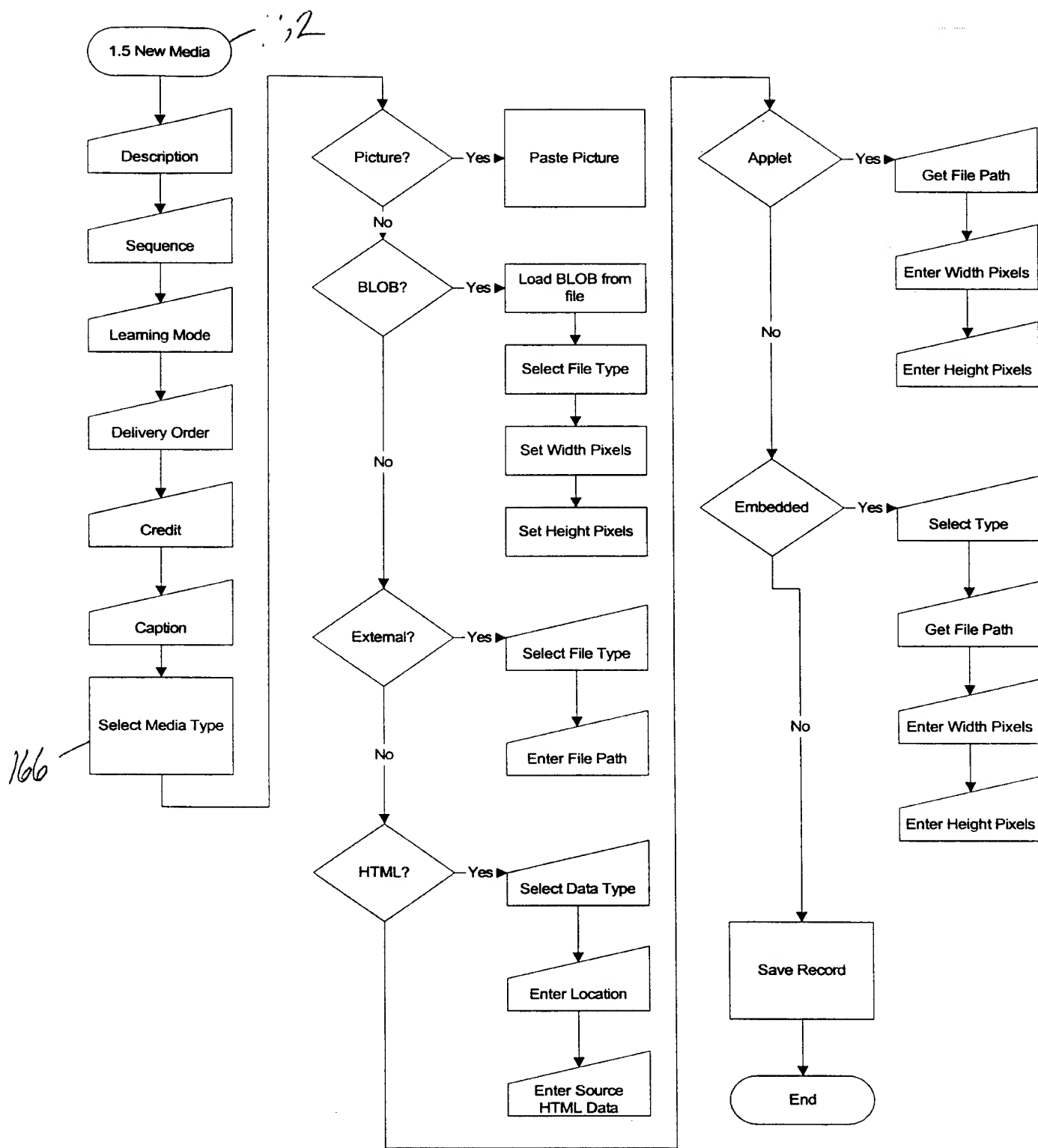


FIG. 4 E

70158

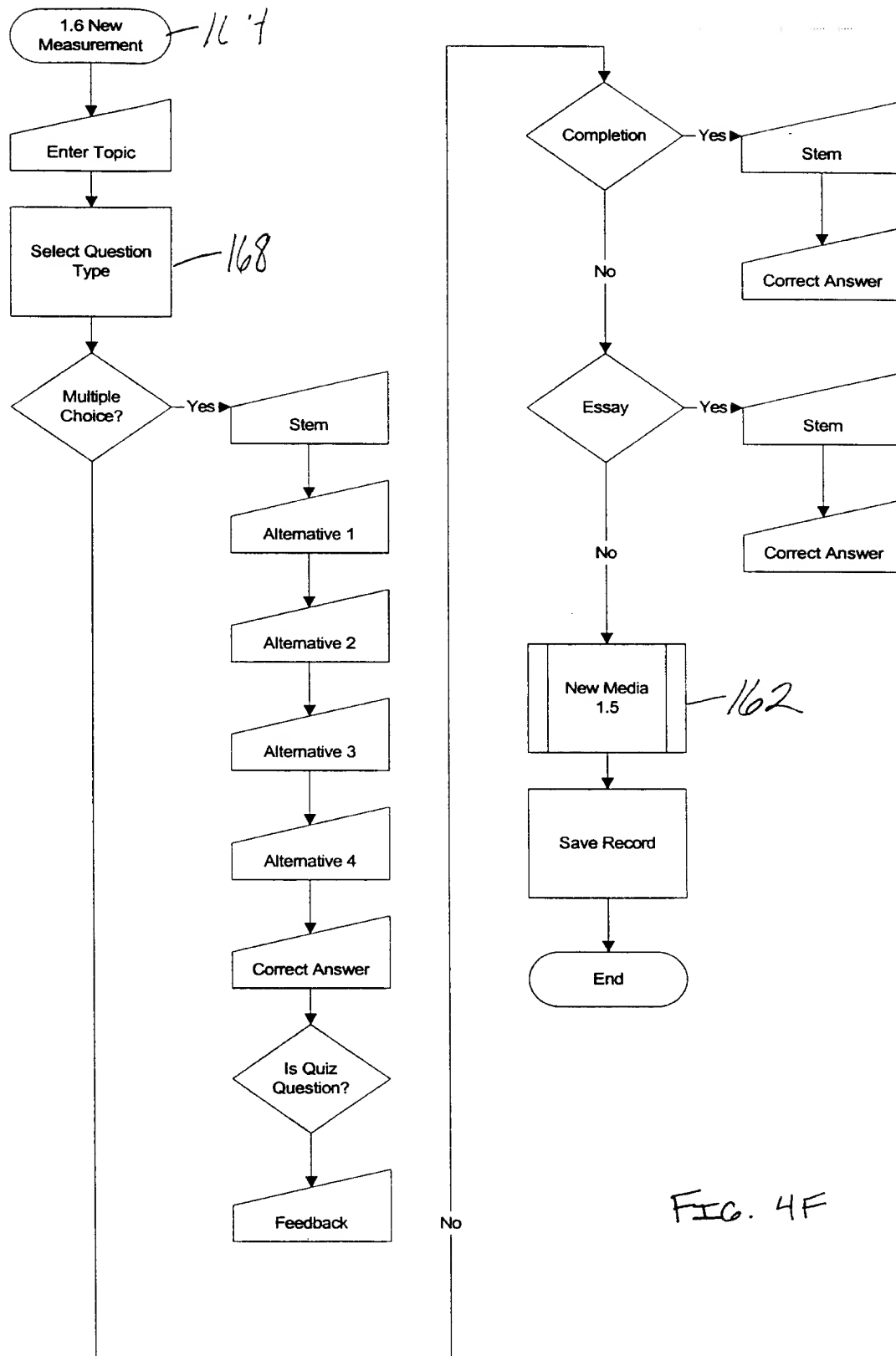


FIG. 4F

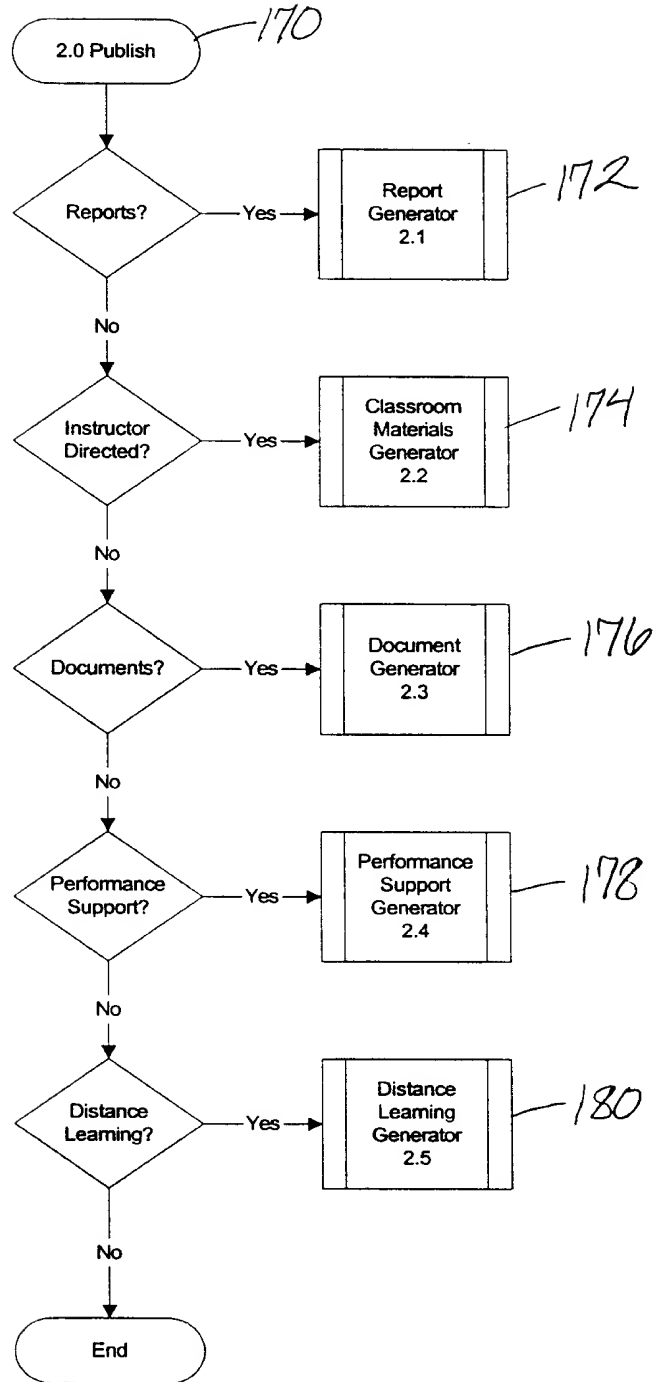


FIG. 5

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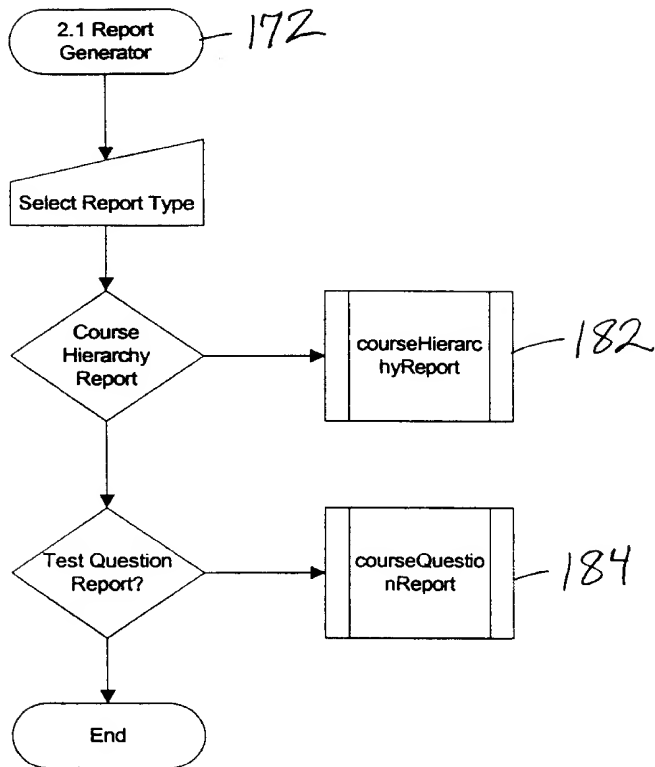


FIG. 5A

13158

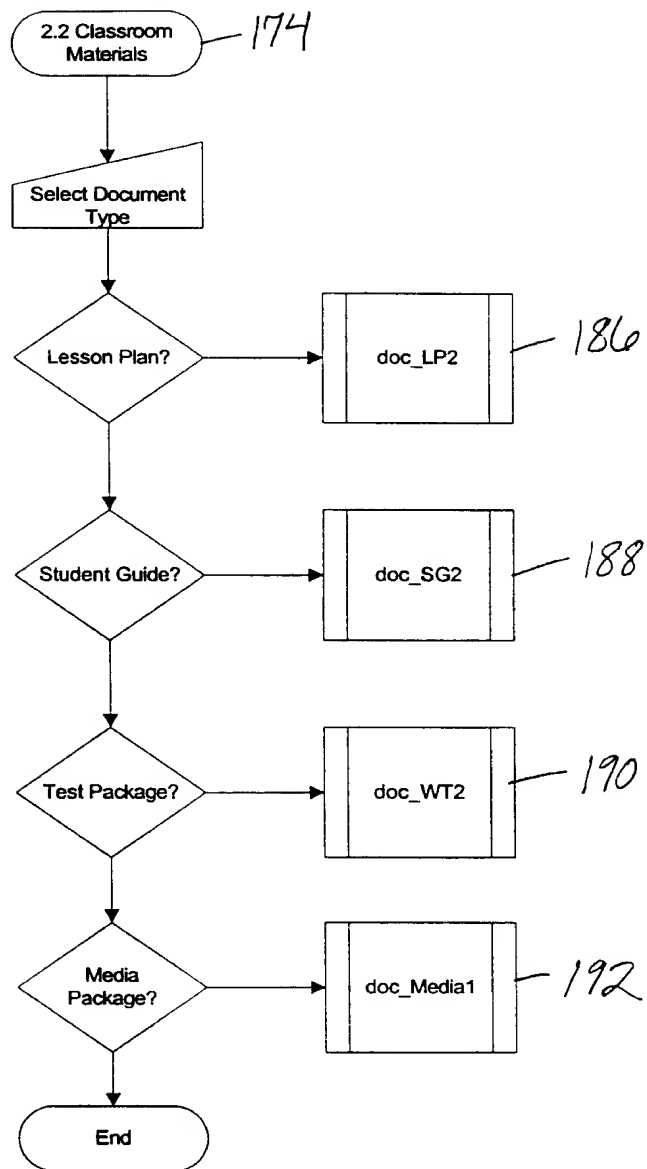


FIG. 5B

74158

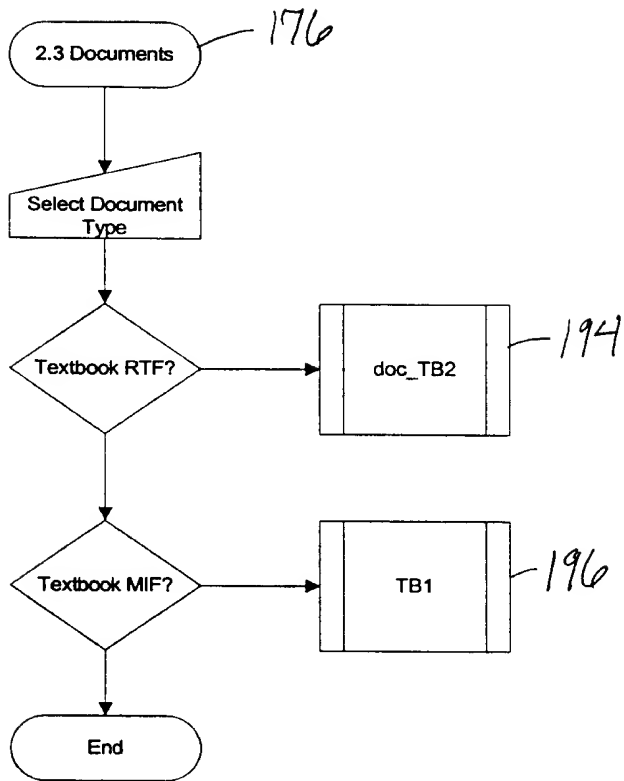


FIG. 5C

75158

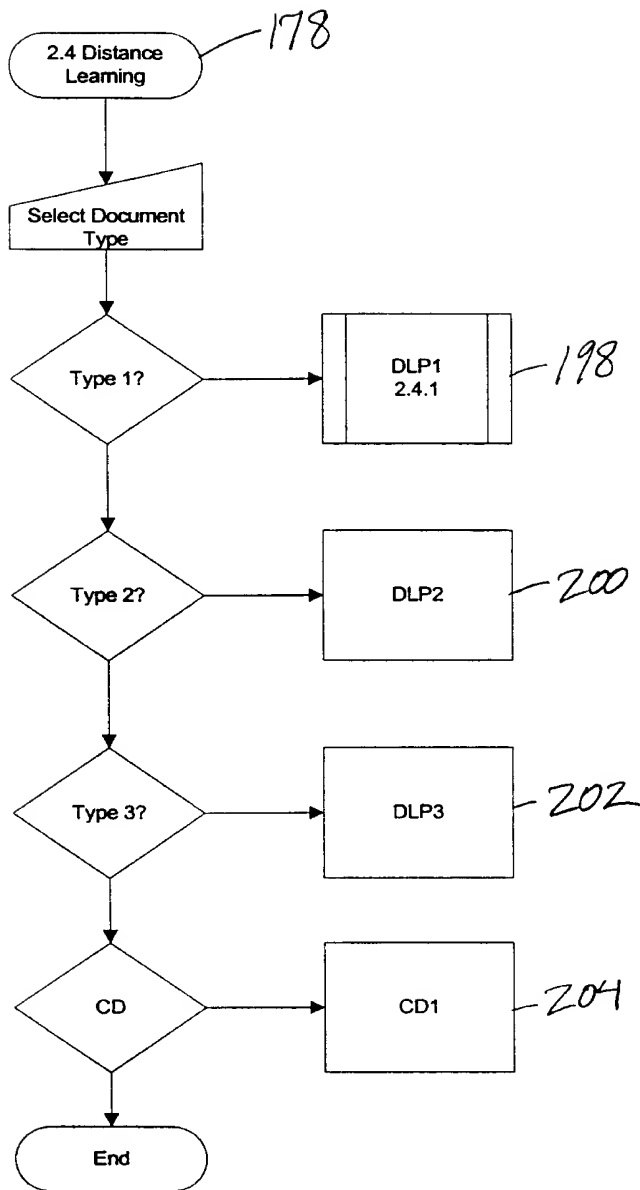


FIG. 5D

16158

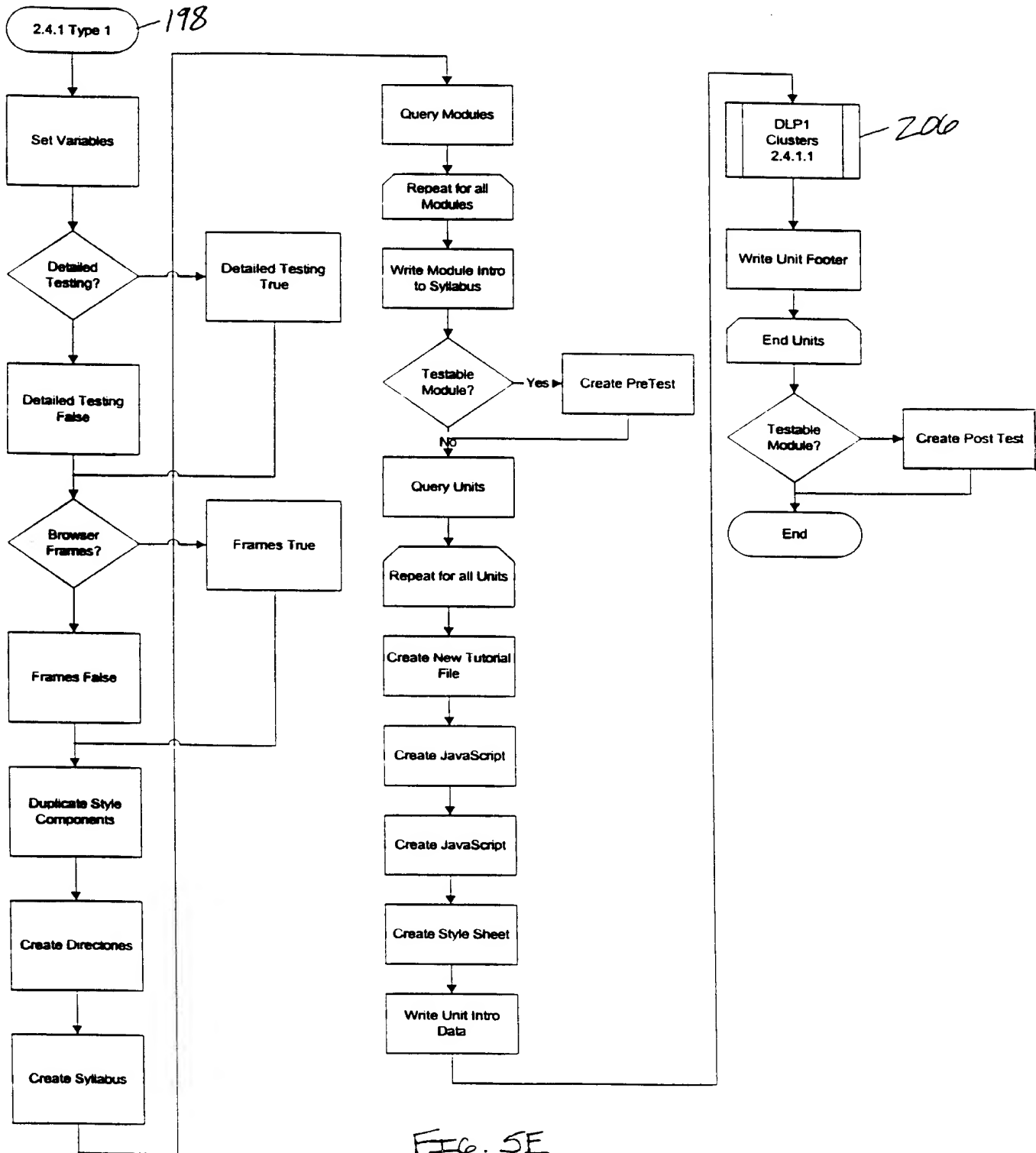


FIG. 5E

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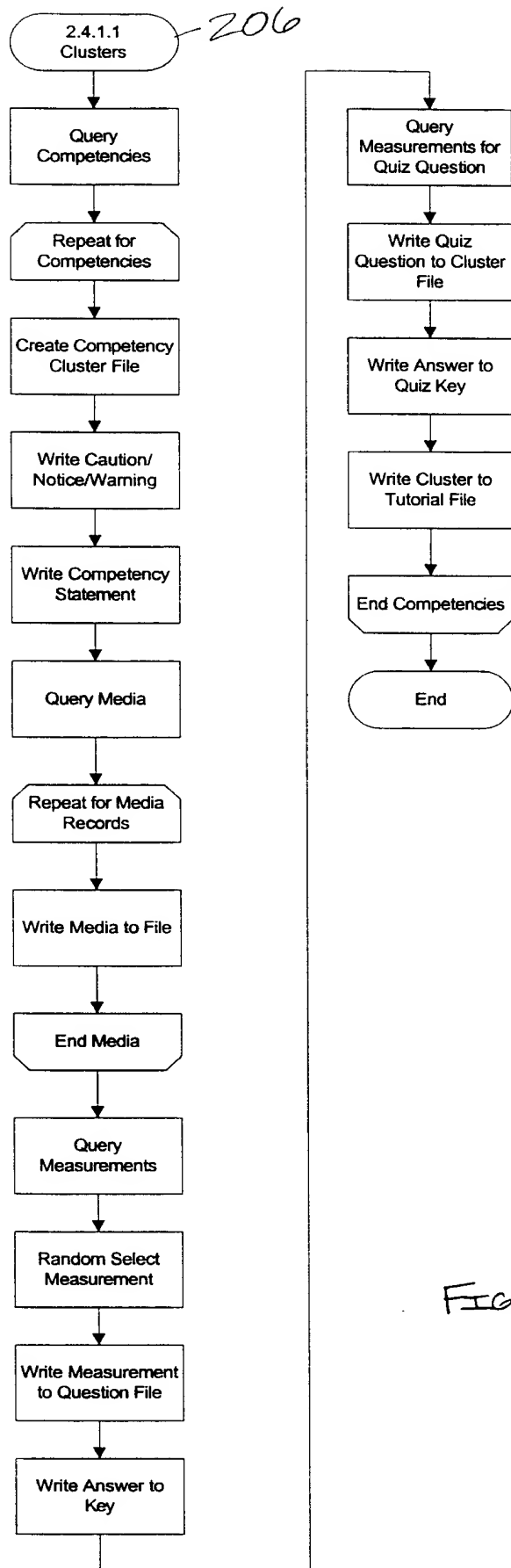


FIG. 5F

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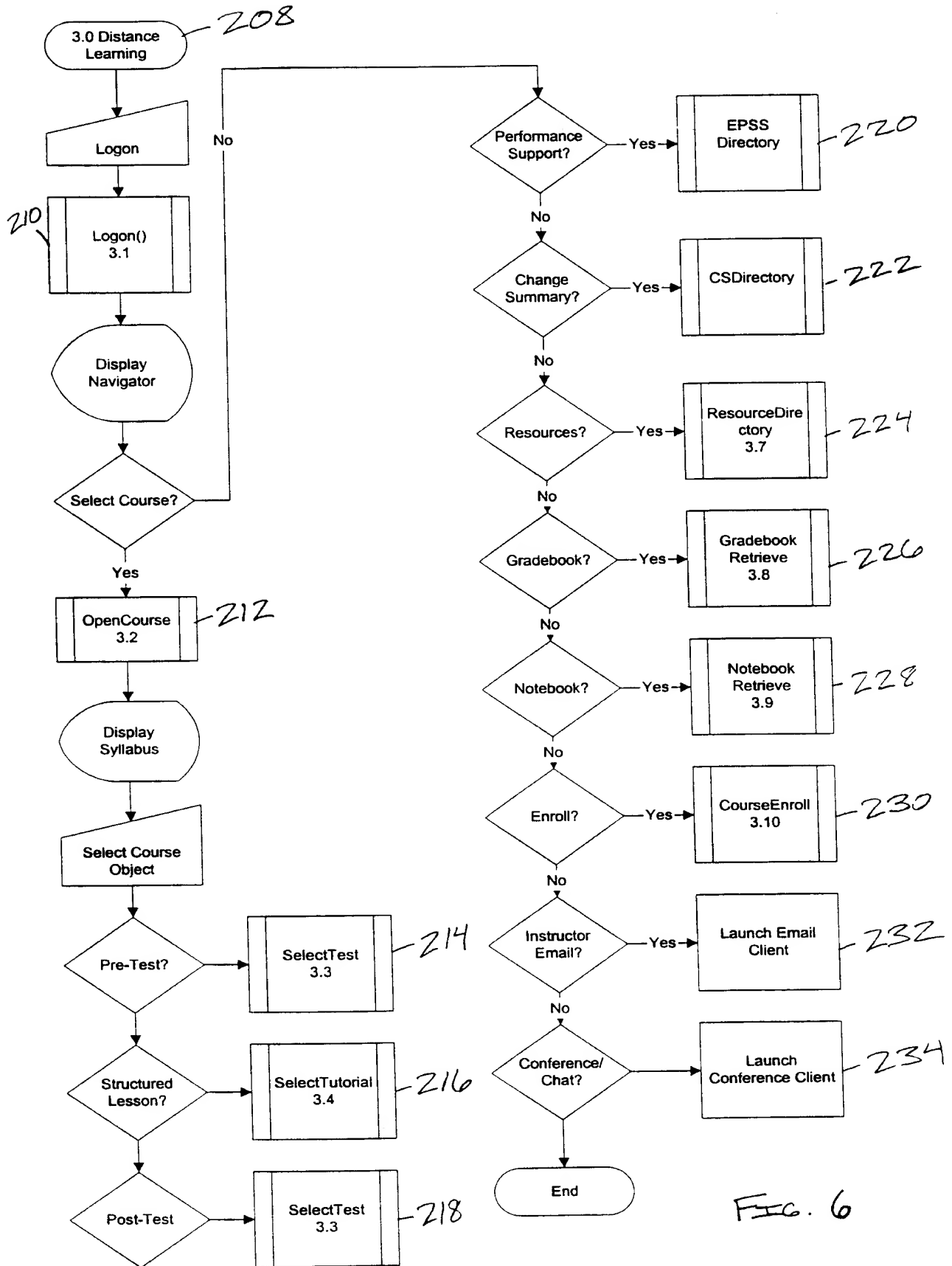


FIG. 6

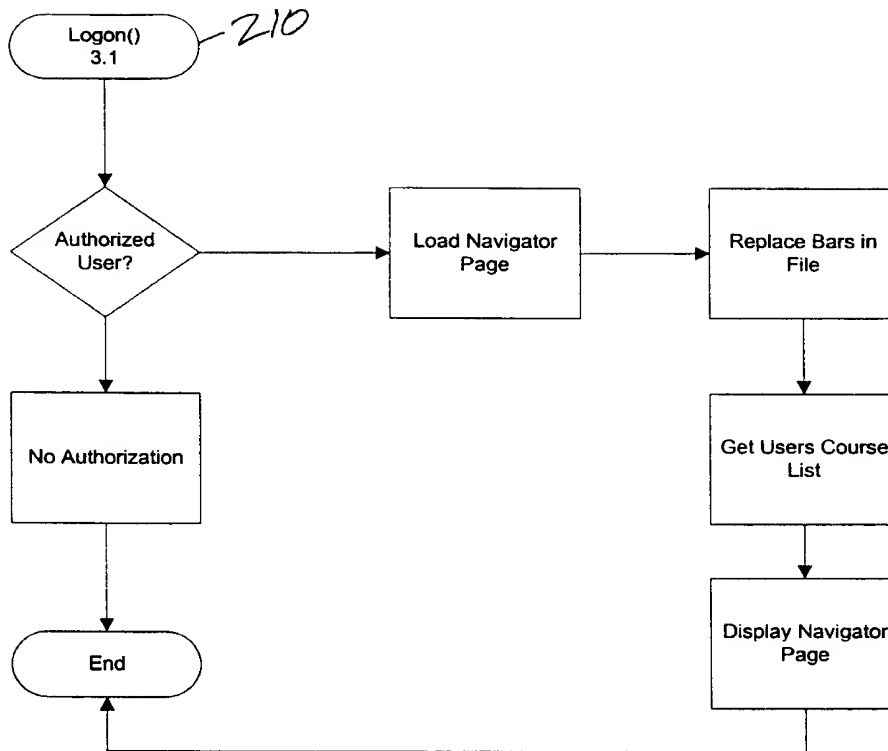


FIG. 6A

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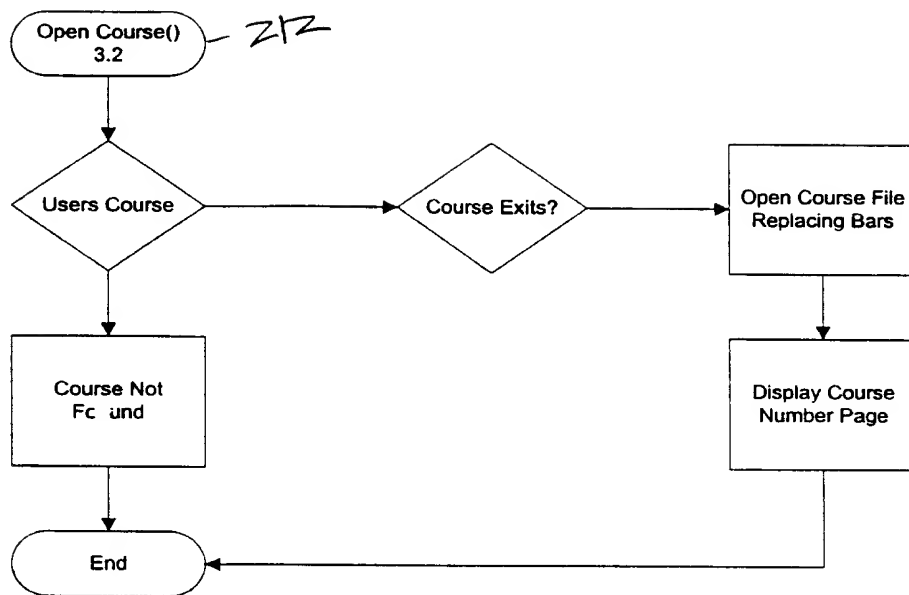


FIG. 6B

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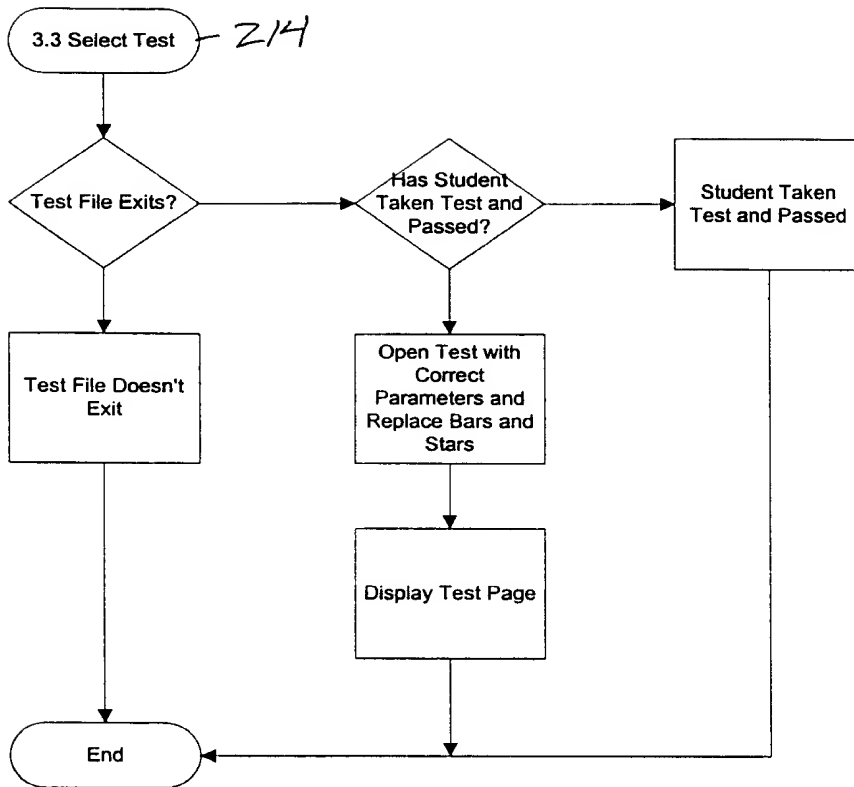


FIG. 6C

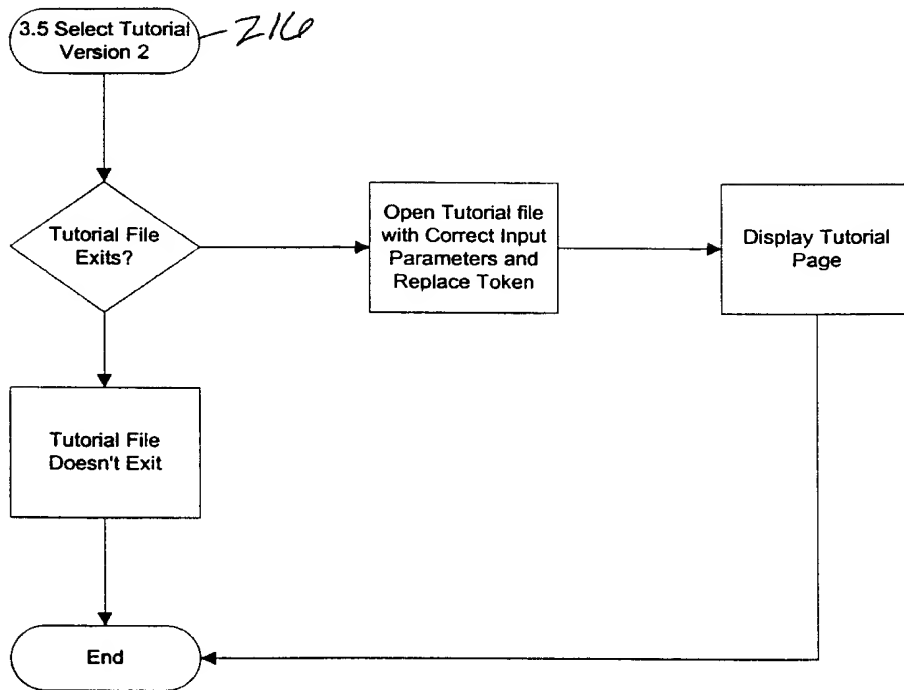


FIG. 6D

23158

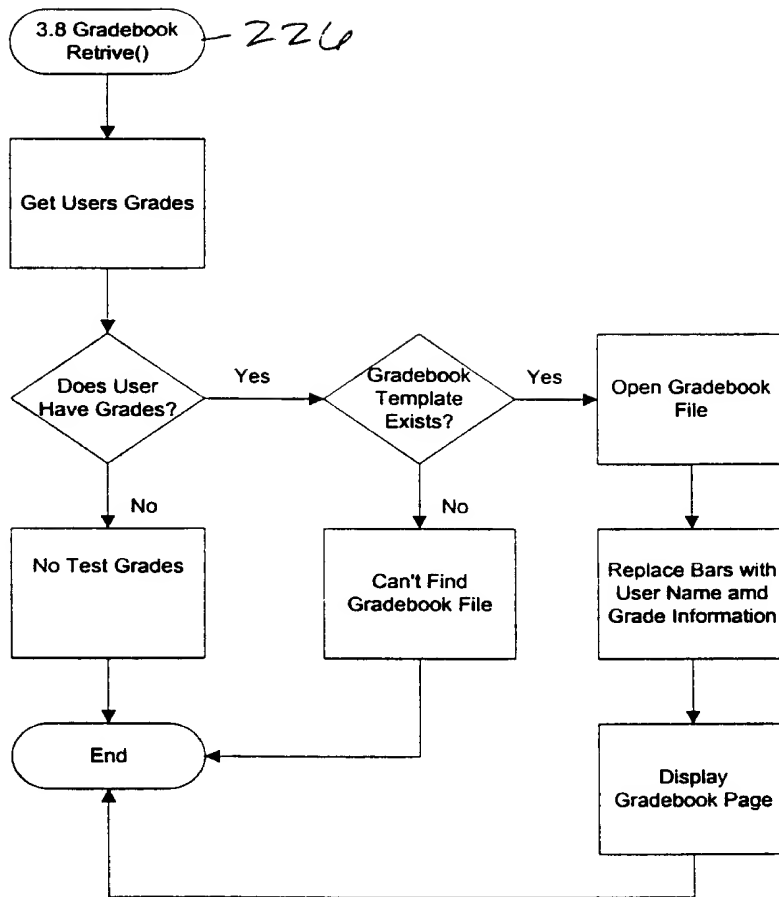


FIG. 6E

24158

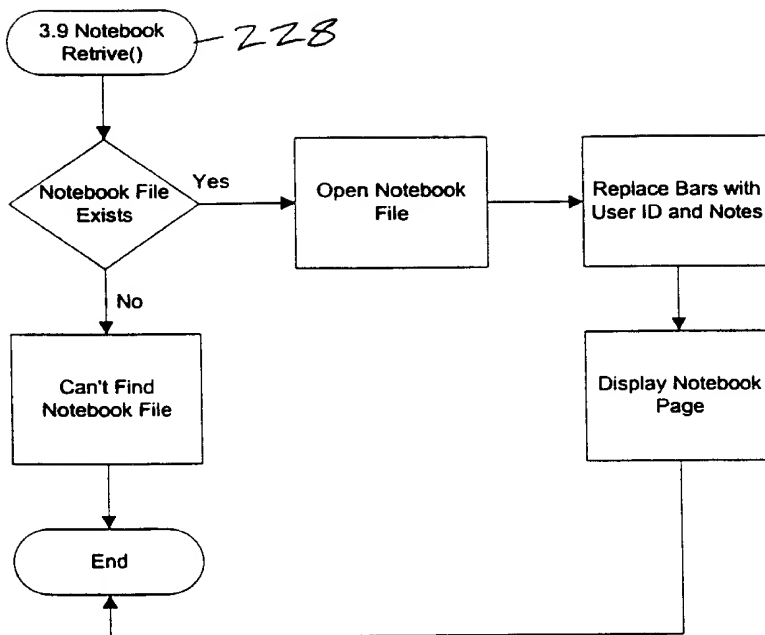


FIG. 6F

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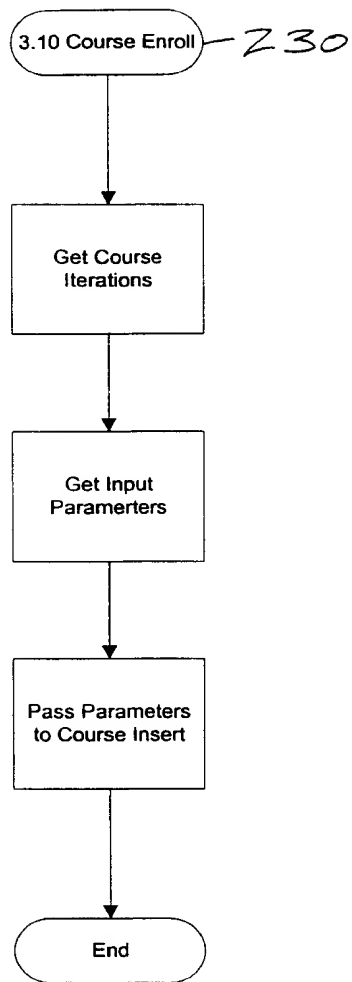


FIG. 66

26158

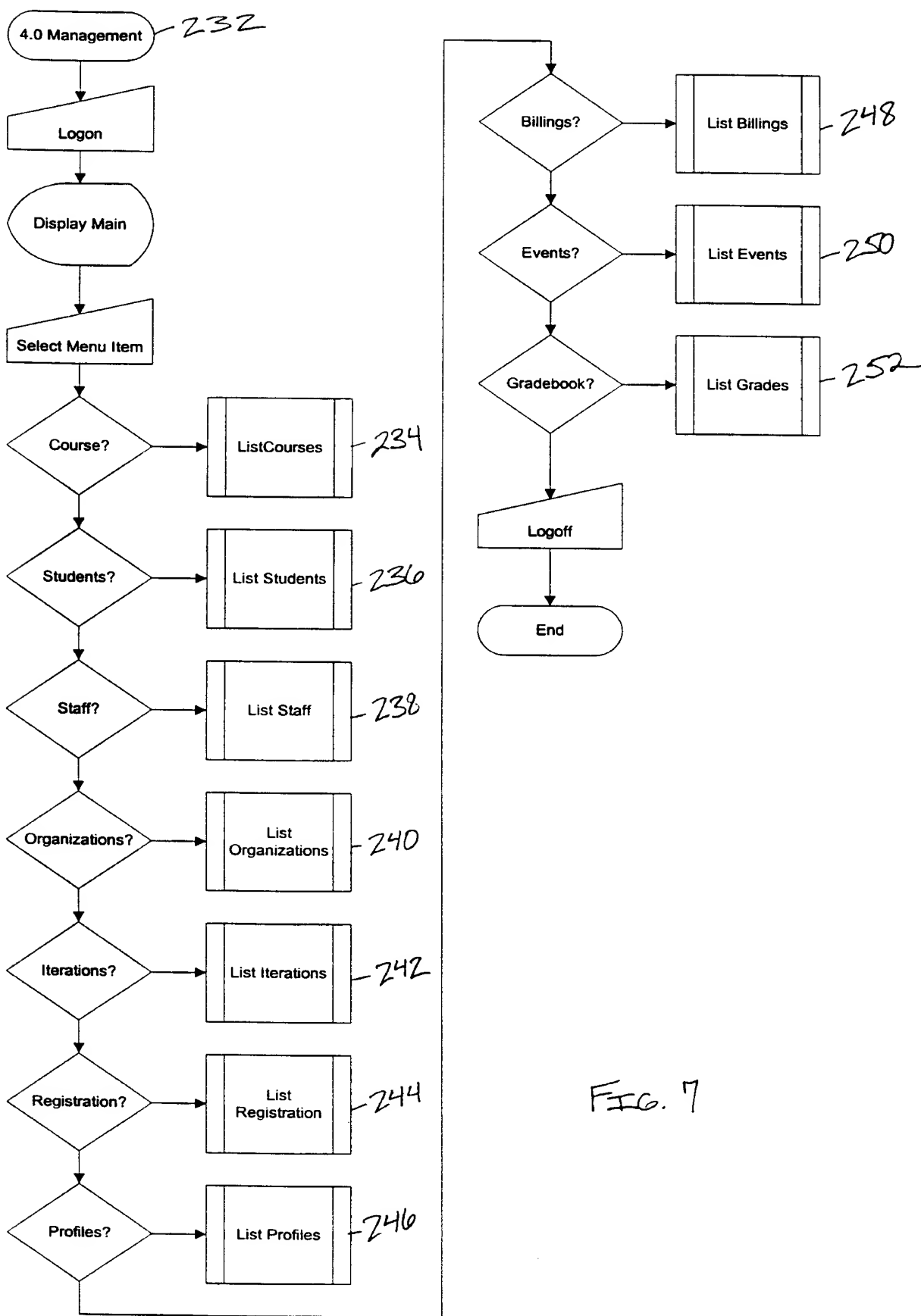


FIG. 7

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Structure for G21D25.4db

Thursday, October 14, 1999

Structure: Course		
Course_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Course_Title	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Course_Number	Alpha 32	Enterable; Modifiable
On_Line_Introduction	Text	Enterable; Modifiable
Document_Introduction	Text	Enterable; Modifiable
Learning_Objective	Text	Enterable; Modifiable
Publisher_Name	Alpha 80	Enterable; Modifiable
Publisher_Address	Text	Enterable; Modifiable
Date_Created	Date	Mandatory; Enterable; Modifiable
Date_Modified	Date	Mandatory; Enterable; Modifiable
Author	Alpha 32	Mandatory; Enterable; Modifiable
Proponent_Name	Alpha 80	Enterable; Modifiable
Proponent_Address	Text	Enterable; Modifiable
Classroom_Introduction	Text	Enterable; Modifiable
Credit_Hours	Real	Enterable; Modifiable
Preface	Text	Enterable; Modifiable
Active_Channel	Boolean	Enterable; Modifiable
Title_text_color	Alpha 20	Enterable; Modifiable
Write_	Picture	Enterable; Modifiable
Body_text_color	Alpha 20	Enterable; Modifiable
Title_font	Alpha 80	Enterable; Modifiable
Body_font	Alpha 80	Enterable; Modifiable

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Fig. 8A

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Structure for G21D25.4db

Thursday, October 14, 1999

Structure: Module		
Module_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Module_Title	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Module_Number	Alpha 80	Enterable; Modifiable
Document_Introduction	Text	Enterable; Modifiable
Lesson_Introduction	Text	Enterable; Modifiable
Instructor_Guidance	Text	Enterable; Modifiable
Training_Area_Description	Text	Enterable; Modifiable
Optimum_Class_Size	Integer	Enterable; Modifiable
Learning_Objective	Text	Enterable; Modifiable
Instructor_Directed	Boolean	Enterable; Modifiable
Self_Directed	Boolean	Enterable; Modifiable
Distance_Learning	Boolean	Enterable; Modifiable
Practical_Application	Boolean	Enterable; Modifiable
Measurement	Boolean	Enterable; Modifiable
Document	Boolean	Enterable; Modifiable
Date_Created	Date	Enterable; Modifiable
Date_Modified	Date	Enterable; Modifiable
Author	Alpha 80	Enterable; Modifiable
Course_ID	Alpha 16	Indexed; Mandatory; Enterable; Modifiable
Sequence_Number	Real	Indexed; Enterable; Modifiable
Pre_Test_Instructions	Text	Enterable; Modifiable
Post_Test_Instructions	Text	Enterable; Modifiable
On_Line_Introduction	Text	Enterable; Modifiable

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Fig. 8B

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Structure for G21D25.4db

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Structure: Unit		
Unit_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Unit_Title	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Unit_Number	Alpha 80	Enterable; Modifiable
Instructor_Notes	Text	Enterable; Modifiable
Language	Alpha 80	Enterable; Modifiable
On_Line_Introduction	Text	Enterable; Modifiable
Document_Introduction	Text	Enterable; Modifiable
Lesson_Introduction	Text	Enterable; Modifiable
Learning_Objective	Text	Enterable; Modifiable
Date_Created	Date	Mandatory; Enterable
Date_Modified	Date	Mandatory; Enterable; Modifiable
Author	Alpha 80	Mandatory; Enterable; Modifiable
Instructor_Directed	Boolean	Enterable; Modifiable
Self_Directed	Boolean	Enterable; Modifiable
Distance_Learning	Boolean	Enterable; Modifiable
Practical_Application	Boolean	Enterable; Modifiable
Measurement	Boolean	Enterable; Modifiable
Document	Boolean	Enterable; Modifiable

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Fig. 8C

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Structure for G21D25.4db

Thursday, October 14, 1999

Structure: Competency		
Competency_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Unit_ID	Alpha 16	Indexed; Enterable; Modifiable
Description	Text	Enterable; Modifiable
Competency_Statement	Text	Mandatory; Enterable; Modifiable
Domain	Alpha 12	Enterable; Modifiable
The_Verb	Alpha 32	Indexed; Enterable; Modifiable
Learning_Style	Alpha 32	Choices; Enterable; Modifiable
Mode	Alpha 32	Enterable; Modifiable
Instructor_Directed_Time	Time	Enterable; Modifiable
Self_Directed_Time	Time	Enterable; Modifiable
Distance_Learning_Time	Time	Enterable; Modifiable
Practical_Application_Time	Time	Enterable; Modifiable
Written_Measurement_Time	Time	Enterable; Modifiable
Practical_Measurement_Time	Time	Enterable; Modifiable
Instructor_Directed	Boolean	Enterable; Modifiable
Self_Directed	Boolean	Enterable; Modifiable
Distance_Learning	Boolean	Enterable; Modifiable
Practical_Application	Boolean	Enterable; Modifiable
Performance_Test	Boolean	Enterable; Modifiable
Written_Test	Boolean	Enterable; Modifiable
Index_Entry	Text	Enterable; Modifiable
References	Text	Enterable; Modifiable
Learning_Objective	Text	Enterable; Modifiable
Consumables	Text	Enterable; Modifiable
Sequence_Number	Real	Enterable; Modifiable
Notice	Text	Enterable; Modifiable
Caution	Text	Enterable; Modifiable
Warning	Text	Enterable; Modifiable
Procedure	Boolean	Enterable; Modifiable
Standard	Text	Enterable; Modifiable
Document	Boolean	Enterable; Modifiable
Instructor_Notes	Text	Enterable; Modifiable

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Fig. 8D

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Structure for G21D25.4db

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Performance_Support	Boolean	Enterable; Modifiable
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FIG. 8D (cont.)

Structure: Element		
Element_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Competency_ID	Alpha 16	Indexed; Mandatory; Enterable; Modifiable
Indenture_Level	Integer	Mandatory; Enterable; Modifiable
Sequence_Number	Real	Indexed; Mandatory; Enterable; Modifiable
Element_Title	Text	Mandatory; Enterable; Modifiable
Domain	Alpha 12	Choices; Enterable; Modifiable
Classification	Alpha 10	Enterable; Modifiable
Sorting Title	Alpha 80	Invisible; Enterable; Modifiable
Description	Text	Enterable; Modifiable
Notice	Text	Enterable; Modifiable
Caution	Text	Enterable; Modifiable
Warning	Text	Enterable; Modifiable
Instructor_Notes	Text	Enterable; Modifiable
Index_Entry	Text	Enterable; Modifiable
Standard	Text	Enterable; Modifiable

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FIG. 8E

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Structure for G21D25.4db

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Structure: Media		
Media_ID	Alpha 16	Indexed; Unique; Mandatory
Element_ID	Alpha 16	Indexed; Enterable; Modifiable
Competency_ID	Alpha 16	Indexed; Enterable; Modifiable
Sequence_Number	Integer	Indexed; Mandatory; Enterable; Modifiable
Description	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Instructor_Directed	Boolean	Enterable; Modifiable
Self_Directed	Boolean	Enterable; Modifiable
Distance_Learning	Boolean	Enterable; Modifiable
Measurement	Boolean	Enterable; Modifiable
Document	Boolean	Enterable; Modifiable
Type	Alpha 32	Choices; Mandatory; Enterable; Modifiable
Caption	Text	Enterable; Modifiable
Question_ID	Alpha 16	Indexed; Enterable; Modifiable
Ext_Media_Path	Text	Enterable; Modifiable
Picture_Data	Picture	Enterable; Modifiable
BLOB_Media_Data	BLOB	Enterable; Modifiable
BLOB_Media_Type	Alpha 32	Enterable; Modifiable
HTML_Type	Alpha 20	Choices; Enterable; Modifiable
Source	Text	Enterable; Modifiable
Location_URL	Alpha 80	Enterable; Modifiable
Script_Text	Text	Enterable; Modifiable
Thumbnail	Picture	Enterable; Modifiable
Credit	Alpha 80	Enterable; Modifiable
Ext_Media_Type	Alpha 32	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
File List	Text	Enterable; Modifiable
Width	Real	Enterable; Modifiable
Height	Real	Enterable; Modifiable
Source File	Text	Enterable; Modifiable
Embedded File Type	Alpha 32	Enterable; Modifiable
Learning Mode	Alpha 20	Enterable; Modifiable
Delivery Order	Integer	Enterable; Modifiable

FIG. 8F

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Structure for G21D25.4db

Unit ID	Alpha 16	Indexed; Enterable; Modifiable
Non_Comp_Usage	Alpha 32	Enterable; Modifiable
Module_ID	Alpha 20	Indexed; Enterable; Modifiable

FIG. 8F (cont)

Structure: Question		
Question_ID	Alpha 16	Indexed; Unique; Mandatory
Topic	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Type	Alpha 32	Choices; Mandatory; Enterable; Modifiable
Stem	Text	Enterable; Modifiable
MC_Alternative_1	Text	Enterable; Modifiable
MC_Alternative_2	Text	Enterable; Modifiable
MC_Alternative_3	Text	Enterable; Modifiable
MC_Alternative_4	Text	Enterable; Modifiable
MC_Answer	Real	Enterable; Modifiable
FIB_Answer	Text	Enterable; Modifiable
Essay_Answer	Text	Enterable; Modifiable
Include_Graphic	Boolean	Enterable; Modifiable
Graphic_Data	Picture	Enterable; Modifiable
Date_Created	Date	Enterable; Modifiable
Date_Modified	Date	Enterable; Modifiable
Author	Alpha 80	Enterable; Modifiable
Element_ID	Alpha 32	Indexed; Enterable; Modifiable
Feedback	Text	Enterable; Modifiable
Competency_ID	Alpha 32	Indexed; Enterable; Modifiable
Quiz	Boolean	Enterable; Modifiable

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FIG. 8G

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Structure for G21D25.4db

Thursday, October 14, 1999

Structure: Resource		
Resource_ID	Alpha 16	Indexed; Unique; Mandatory; Modifiable
Description	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Part Number	Alpha 80	Enterable; Modifiable
Vendor Name	Alpha 80	Indexed; Enterable; Modifiable
Type	Alpha 32	Indexed; Mandatory; Enterable; Modifiable
Publisher Manufacturer Name	Alpha 80	Enterable; Modifiable

FIG. 8H

Structure: Verb		
Verb_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
Verb	Alpha 32	Indexed; Mandatory; Enterable; Modifiable
Domain	Alpha 16	Indexed; Mandatory; Enterable; Modifiable
Description	Text	Enterable; Modifiable
Level	Alpha 50	Enterable; Modifiable

FIG. 8I

Structure: Resource_to_Cluster		
R2C_ID	Alpha 32	Indexed; Unique; Mandatory; Enterable
Competency_ID	Alpha 16	Indexed; Mandatory; Modifiable
Reserved	Alpha 32	Invisible; Choices; Enterable; Modifiable
Resource Description	Alpha 80	Indexed; Mandatory; Enterable; Modifiable
Resource_Quantity	Integer	Mandatory; Enterable; Modifiable

FIG. 8J

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Structure: Module_Link			
Module_Link_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable; Modifiable	- 274
Module_ID	Alpha 16	Indexed; Enterable; Modifiable	
Unit_ID	Alpha 32	Indexed; Enterable; Modifiable	
Sequence_Number	Real	Enterable; Modifiable	

FIG. 8K

Structure: Taxonomy		
Record_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable; Modifiable
Level	Alpha 32	Indexed; Mandatory; Enterable; Modifiable
Lecture	Integer	Enterable; Modifiable
Demonstration	Integer	Enterable; Modifiable
Tutorial	Integer	Enterable; Modifiable
Algorithms	Integer	Enterable; Modifiable
Guidelines	Integer	Enterable; Modifiable
Self Study	Integer	Enterable; Modifiable
Practice	Integer	Enterable; Modifiable
Hands on	Integer	Enterable; Modifiable
Paraphrasing	Integer	Enterable; Modifiable
Cause and Effect	Integer	Enterable; Modifiable
Memory Aids	Integer	Enterable; Modifiable
Discussion	Integer	Enterable; Modifiable
Overtraining	Integer	Enterable; Modifiable
Real World	Integer	Enterable; Modifiable
Simulation	Integer	Enterable; Modifiable
CAI	Integer	Enterable; Modifiable
Motion	Integer	Enterable; Modifiable
Still	Integer	Enterable; Modifiable
Audio	Integer	Enterable; Modifiable
Illustration	Integer	Enterable; Modifiable
Text	Integer	Enterable; Modifiable

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FIG. 8L

Structure for G21D25.4db

Thursday, October 14, 1999

Structure: Preferences		
Parameter_ID	Alpha 16	Indexed; Unique; Mandatory; Enterable
System Code	Alpha 5	Mandatory; Enterable; Modifiable
Century Code	Integer	Mandatory; Enterable; Modifiable
Pivot Year	Integer	Mandatory; Enterable; Modifiable
Next Course ID	Long Integer	Enterable; Modifiable
Next Module ID	Long Integer	Enterable; Modifiable
Next Module Link ID	Long Integer	Enterable; Modifiable
Next Unit ID	Long Integer	Enterable; Modifiable
Next Unit Link ID	Long Integer	Enterable; Modifiable
Next Competency ID	Long Integer	Enterable; Modifiable
Next Element ID	Long Integer	Enterable; Modifiable
Next Verb ID	Long Integer	Enterable; Modifiable
Next R2C ID	Long Integer	Enterable; Modifiable
Next Resource ID	Long Integer	Enterable; Modifiable
Next Media ID	Long Integer	Enterable; Modifiable
Next Question ID	Long Integer	Enterable; Modifiable
Host OS	Alpha 20	Enterable; Modifiable
Serial Number	Alpha 20	Enterable; Modifiable
Licensee	Alpha 32	Enterable; Modifiable
Issue Date	Date	Enterable; Modifiable
Document_Path	Alpha 80	Enterable; Modifiable
Expiration_Date	Date	Enterable; Modifiable
Default_Browser	Alpha 80	Enterable; Modifiable
Last_Update	Real	Enterable; Modifiable

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FIG. 8M

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Structure for G21M250

Thursday, October 14, 1999

Structure: Student		
Student_Record_ID	Integer	Indexed; Enterable; Modifiable
LastName	Alpha 40	Indexed; Enterable; Modifiable
FirstName	Alpha 30	Enterable; Modifiable
Middle Initial	Alpha 20	Enterable; Modifiable
Student_ID	Alpha 20	Indexed; Unique; Mandatory; Enterable; Modifiable
HomeAddress	Alpha 80	Enterable; Modifiable
HomeCity	Alpha 40	Enterable; Modifiable
HomeState	Alpha 20	Enterable; Modifiable
Home_Zip_Postal_Code	Alpha 20	Enterable; Modifiable
HomeVOX	Alpha 20	Enterable; Modifiable
HomeFAX	Alpha 20	Enterable; Modifiable
Pager	Alpha 80	Enterable; Modifiable
E-Mail_Home	Alpha 80	Enterable; Modifiable
E-Mail_Work	Alpha 80	Enterable; Modifiable
OrganizationName	Alpha 80	Indexed; Enterable; Modifiable
Title	Alpha 50	Enterable; Modifiable
Gender	Alpha 20	Enterable; Modifiable
EO_Category	Alpha 20	Enterable; Modifiable
MailStop	Alpha 50	Enterable; Modifiable
WorkVOX	Alpha 20	Enterable; Modifiable
WorkFAX	Alpha 20	Enterable; Modifiable
HomeCountry	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
DateCreated	Date	Mandatory; Enterable; Modifiable
DateModified	Date	Mandatory; Enterable; Modifiable
User_Name	Alpha 20	Indexed; Unique; Enterable; Modifiable
Password	Alpha 20	Enterable; Modifiable
Date_of_Birth	Date	Enterable; Modifiable
Extended_LastName	Alpha 80	Enterable; Modifiable
Language	Alpha 35	Enterable; Modifiable
Manager_Name	Alpha 30	Enterable; Modifiable
Manager_VOX	Alpha 20	Enterable; Modifiable

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FIG. 9A

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Structure for G21M250

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Manager_FAX	Alpha 20	Enterable; Modifiable
Manager_Email	Alpha 20	Enterable; Modifiable
Manager_Org_Code	Alpha 20	Enterable; Modifiable
Special_Requirements	Text	Enterable; Modifiable
Admin	Boolean	Enterable; Modifiable
Notebook	Text	Enterable; Modifiable

FIG. 9A (cont.)

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Structure for G21M250

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Structure: CourseIterations		
Iteration_ID	Integer	Indexed; Unique; Mandatory; Enterable; Modifiable
Course_ID	Alpha 20	Enterable; Modifiable
Enrollment_Cat	Alpha 20	Enterable; Modifiable
URL	Alpha 20	Enterable; Modifiable
Capacity	Integer	Enterable; Modifiable
Staff_ID	Integer	Indexed; Enterable; Modifiable
Location	Alpha 20	Enterable; Modifiable
StartDate	Date	Enterable; Modifiable
EndDate	Date	Enterable; Modifiable
StartTime	Time	Enterable; Modifiable
EndTime	Time	Enterable; Modifiable
Days_of_Week	Alpha 20	Enterable; Modifiable
CO_Record_ID	Integer	Indexed; Enterable; Modifiable
Location_Facility_Name	Alpha 40	Enterable; Modifiable
Location_Address_1	Alpha 40	Enterable; Modifiable
Location_Address_2	Alpha 40	Enterable; Modifiable
Location_City	Alpha 35	Enterable; Modifiable
Location_State	Alpha 2	Enterable; Modifiable
Location_Country	Alpha 20	Enterable; Modifiable
Location_Zip_Postal_Code	Alpha 20	Enterable; Modifiable
Location_Room_Number	Alpha 20	Enterable; Modifiable
Location_Contact	Alpha 20	Enterable; Modifiable
Location_Contact_VOX	Alpha 20	Enterable; Modifiable
Location_Contact_FAX	Alpha 20	Enterable; Modifiable
Location_Contact_Email	Alpha 40	Enterable; Modifiable
Iteration_Manager_Name	Alpha 20	Enterable; Modifiable
Iteration_Manager_VOX	Alpha 20	Enterable; Modifiable
Iteration_Manager_Fax	Alpha 20	Enterable; Modifiable
Iteration_Manager_Email	Alpha 80	Enterable; Modifiable
Instructors	Text	Enterable; Modifiable
Student_Load_Maximum	Integer	Enterable; Modifiable
Student_Load_Minimum	Integer	Enterable; Modifiable

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FIG. 9B

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Structure for G21M250

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Allow_Wait_List	Boolean	Enterable; Modifiable
Certificates_Issued	Boolean	Enterable; Modifiable
Facility_Fee	Integer	Enterable; Modifiable
Facility_Fee_Description	Text	Enterable; Modifiable
Instructor_Fee	Integer	Enterable; Modifiable
Instructor_Fee_Description	Text	Enterable; Modifiable
Material_Fee	Integer	Enterable; Modifiable
Material_Fee_Description	Text	Enterable; Modifiable
Facility_Seats	Real	Enterable; Modifiable
Student_Provided_Items	Text	Enterable; Modifiable
Other_Fees	Integer	Enterable; Modifiable
Other_Fee_Description	Text	Enterable; Modifiable
Status	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Training_Resources	Text	Enterable; Modifiable
Student_Resources	Text	Enterable; Modifiable
Consumable_Resources	Text	Enterable; Modifiable
Passing_Score	Integer	Enterable; Modifiable
Threshold_Score	Integer	Enterable; Modifiable
Performance_Test	Boolean	Enterable; Modifiable

FIG. 9B (cont.)

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Structure for G21M250

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Structure: Registration		
Registration_Record_ID	Integer	Indexed; Unique; Enterable
Iteration_ID	Integer	Indexed; Mandatory; Enterable; Modifiable
Student_Record_ID	Integer	Indexed; Enterable
DateStamp	Date	Enterable; Modifiable
TimeStamp	Time	Enterable; Modifiable
Requestor_Name	Alpha 40	Enterable; Modifiable
Requestor_VOX	Alpha 20	Enterable; Modifiable
Requestor_FAX	Alpha 20	Enterable; Modifiable
Requestor_Email	Alpha 40	Enterable; Modifiable
WaitList	Boolean	Enterable; Modifiable
CourseCompleted	Boolean	Enterable; Modifiable
DateComplete	Date	Enterable; Modifiable
NextCourseDate	Date	Enterable; Modifiable

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FIG. 9C

Structure: Gradebook		
Gradebook_ID	Integer	Indexed; Unique; Mandatory; Enterable; Modifiable
Course_ID	Alpha 20	Indexed; Enterable; Modifiable
Student_Record_ID	Integer	Indexed; Enterable; Modifiable
Event_Record_ID	Integer	Indexed; Enterable; Modifiable
Iteration_ID	Integer	Indexed; Enterable; Modifiable
DateStamp	Date	Enterable; Modifiable
Score	Alpha 20	Enterable; Modifiable
TimeStamp	Time	Enterable; Modifiable
GradeReference	Alpha 35	Mandatory; Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Pass	Boolean	Mandatory; Enterable; Modifiable
Module_ID	Alpha 20	Enterable; Modifiable
Expired	Boolean	Enterable; Modifiable

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FIG. 9D

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Structure for G21M250

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Structure: Organization		
Organization_Record_ID	Integer	Indexed; Unique; Enterable; Modifiable
OrganizationName	Alpha 80	Indexed; Enterable; Modifiable
DivisionName	Alpha 80	Enterable; Modifiable
Address_1	Text	Enterable; Modifiable
Address_2	Text	Enterable; Modifiable
City	Alpha 50	Enterable; Modifiable
State	Alpha 20	Enterable; Modifiable
Country	Alpha 20	Enterable; Modifiable
Zip_Postal_Code	Alpha 20	Enterable; Modifiable
MainVOX	Alpha 20	Enterable; Modifiable
Federal_Facilities_Code	Alpha 20	Enterable; Modifiable
Description	Text	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
DateCreated	Date	Enterable; Modifiable
DateModified	Date	Enterable; Modifiable

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FIG. 9E

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Structure for G21M250

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Structure: Staff		
Staff_ID	Integer	Indexed; Unique; Mandatory; Enterable
LastName	Alpha 20	Enterable; Modifiable
FirstName	Alpha 20	Enterable; Modifiable
MiddleInitial	Alpha 20	Enterable; Modifiable
Category	Alpha 20	Enterable; Modifiable
Title	Alpha 20	Enterable; Modifiable
SSN	Alpha 20	Enterable; Modifiable
HomeAddress	Alpha 20	Enterable; Modifiable
HomeCity	Alpha 20	Enterable; Modifiable
HomeState	Alpha 20	Enterable; Modifiable
Home_Zip_Postal_Code	Alpha 20	Enterable; Modifiable
HomeVOX	Alpha 20	Enterable; Modifiable
HomeFAX	Alpha 20	Enterable; Modifiable
Pager	Alpha 20	Enterable; Modifiable
EMail_Home	Alpha 20	Enterable; Modifiable
EMail_Work	Alpha 20	Enterable; Modifiable
Organization Name	Alpha 50	Indexed; Enterable; Modifiable
Gender	Alpha 20	Enterable; Modifiable
EO_Catergory	Alpha 20	Enterable; Modifiable
MailStop	Alpha 20	Enterable; Modifiable
WorkVOX	Alpha 20	Enterable; Modifiable
WorkFAX	Alpha 20	Enterable; Modifiable
HomeCountry	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
DateCreated	Date	Enterable; Modifiable
DateModified	Date	Enterable; Modifiable

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Fig. 9F

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Structure for G21M250

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Structure: Organization Access		
Org_Access_ID	Alpha 20	Enterable; Modifiable
Iteration_ID	Integer	Indexed; Enterable; Modifiable
Organization_Record_ID	Integer	Indexed; Enterable; Modifiable

Fig. 9C

Structure: Billings		
Billing_Record_ID	Integer	Indexed; Unique; Mandatory; Enterable
Method	Alpha 20	Enterable; Modifiable
PO_Number	Alpha 20	Enterable; Modifiable
Card_Holder_Name	Alpha 20	Enterable; Modifiable
Credit_Card_Number	Alpha 25	Enterable; Modifiable
Expiration_Date	Date	Enterable; Modifiable
Billing_Address_1	Alpha 80	Enterable; Modifiable
Billing_Address_2	Alpha 80	Enterable; Modifiable
Billing_City	Alpha 25	Enterable; Modifiable
Billing_State	Alpha 2	Enterable; Modifiable
Billing_zip_postal	Alpha 20	Enterable; Modifiable
Billing_Country	Alpha 20	Enterable; Modifiable
Credit_Card_Type	Alpha 20	Enterable; Modifiable
Contact_Name	Alpha 20	Enterable; Modifiable
Contact_Address_1	Alpha 20	Enterable; Modifiable
Contact_Address_2	Alpha 20	Enterable; Modifiable
Contact_Company_Name	Alpha 20	Enterable; Modifiable
Contact_City	Alpha 20	Enterable; Modifiable
Contact_Zip_Postal	Alpha 20	Enterable; Modifiable
Contact_Country	Alpha 20	Enterable; Modifiable
Billed	Boolean	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Registration_Record_ID	Integer	Indexed; Enterable; Modifiable

Fig. 9H

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Structure for G21M250

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Structure: CourseObject		
CO_Record_ID	Integer	Indexed; Unique; Mandatory; Enterable
COTitle	Alpha 80	Enterable; Modifiable
CO_ID	Alpha 20	Enterable; Modifiable
DistributionMode	Alpha 20	Enterable; Modifiable
Status	Alpha 20	Enterable; Modifiable
Description	Text	Enterable; Modifiable
Language	Alpha 30	Enterable; Modifiable
Objective	Text	Enterable; Modifiable
Product_Line	Alpha 80	Enterable; Modifiable
Duration	Real	Enterable; Modifiable
Target_Audience	Text	Enterable; Modifiable
Prerequisites	Text	Enterable; Modifiable
Prerequisite_Equivalent_Exp	Text	Enterable; Modifiable
Prerequisite_Equivalent_Course	Text	Enterable; Modifiable
Vendor_Supplied	Boolean	Enterable; Modifiable
Vendor_Company_Name	Alpha 50	Enterable; Modifiable
Vendor_Contact Name	Alpha 40	Enterable; Modifiable
Vendor_Address_1	Alpha 40	Enterable; Modifiable
Vendor_Address_2	Alpha 40	Enterable; Modifiable
Vendor_City	Alpha 20	Enterable; Modifiable
Vendor_State	Alpha 20	Enterable; Modifiable
Vendor_Country	Alpha 20	Enterable; Modifiable
Vendor_Zip_Postal_Code	Alpha 20	Enterable; Modifiable
Vendor_Remarks	Text	Enterable; Modifiable
Fee_Customer	Real	Enterable; Modifiable
Fee_Internal	Real	Enterable; Modifiable
Course_Unit_Cost	Integer	Enterable; Modifiable
Training_Resources	Text	Enterable; Modifiable
Fee_Additional	Integer	Enterable; Modifiable
Fee_Additional_Description	Text	Enterable; Modifiable
Author	Alpha 40	Enterable; Modifiable
Rights_Management	Alpha 40	Enterable; Modifiable

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Fig. 9I

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Structure for G21M250

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Student_Resources	Text	Enterable; Modifiable
Consumable_Resources	Text	Enterable; Modifiable
Passing_Score	Integer	Enterable; Modifiable
Threshold_Score	Integer	Enterable; Modifiable
Performance_Test	Boolean	Enterable; Modifiable
LO_Level	Alpha 40	Enterable; Modifiable
Course_Code	Alpha 20	Enterable; Modifiable

FIG. 9I (cont.)

Structure: Staff Assignment		
Record_ID	Integer	Enterable; Modifiable
Staff_ID	Integer	Indexed; Enterable; Modifiable
Iteration_ID	Integer	Indexed; Enterable; Modifiable
Role	Alpha 30	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable

FIG. 9J

Structure: Student_Profile		
Profile_Record_ID	Integer	Indexed; Enterable; Modifiable
Student_Record_ID	Integer	Indexed; Enterable; Modifiable
Sequence_Number	Integer	Enterable; Modifiable

FIG. 9K

Structure: Profiles		
Profile_Record_ID	Integer	Indexed; Unique; Mandatory; Enterable; Modifiable
Reserved	Integer	Indexed; Enterable; Modifiable
Requirements_Record_ID	Integer	Indexed; Enterable; Modifiable
Profile_Name	Alpha 50	Indexed; Unique; Enterable; Modifiable
Profile_Owner	Alpha 50	Enterable; Modifiable

FIG. 9L

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Structure for G21M250

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Structure: Event Log		
Event_Record_ID	Integer	Indexed; Mandatory; Enterable; Modifiable
Iteration_ID	Integer	Indexed; Enterable; Modifiable
Student_ID	Alpha 30	Indexed; Enterable; Modifiable
Date	Date	Enterable; Modifiable
Time	Time	Enterable; Modifiable
Type	Alpha 40	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable

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FIG. 9M

Structure: Profile_Course		
Profile_Record_ID	Integer	Indexed; Enterable; Modifiable
CO_Record_ID	Integer	Indexed; Enterable; Modifiable
Sequence_Number	Integer	Enterable; Modifiable
Mandatory	Boolean	Enterable; Modifiable
Prerequisite	Integer	Enterable; Modifiable
Periodicity	Alpha 20	Enterable; Modifiable

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FIG. 9N

Structure: Staff Qualification		
Staff_ID	Integer	Indexed; Enterable; Modifiable
CO_Record_ID	Integer	Indexed; Enterable; Modifiable
Role	Alpha 30	Enterable; Modifiable
QualificationDate	Date	Enterable; Modifiable
QualificationLapse	Date	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable

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FIG. 9P

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Structure for G21M250

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Structure: Dialogs		
DialogID	Alpha 20	Enterable; Modifiable
Result	Text	Enterable; Modifiable

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FIG. 9Q

Structure: TrackTest		
Registration_Record_ID	Integer	Indexed; Enterable; Modifiable
Course_ID	Alpha 20	Indexed; Enterable; Modifiable
Course_Title	Alpha 80	Enterable; Modifiable
Module_ID	Alpha 20	Enterable; Modifiable
Module_Title	Alpha 80	Enterable; Modifiable
Completed	Boolean	Enterable; Modifiable
DateComplete	Date	Enterable; Modifiable
TimeComplete	Time	Enterable; Modifiable

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FIG. 9R

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High Level User Workflow

Update Center Process

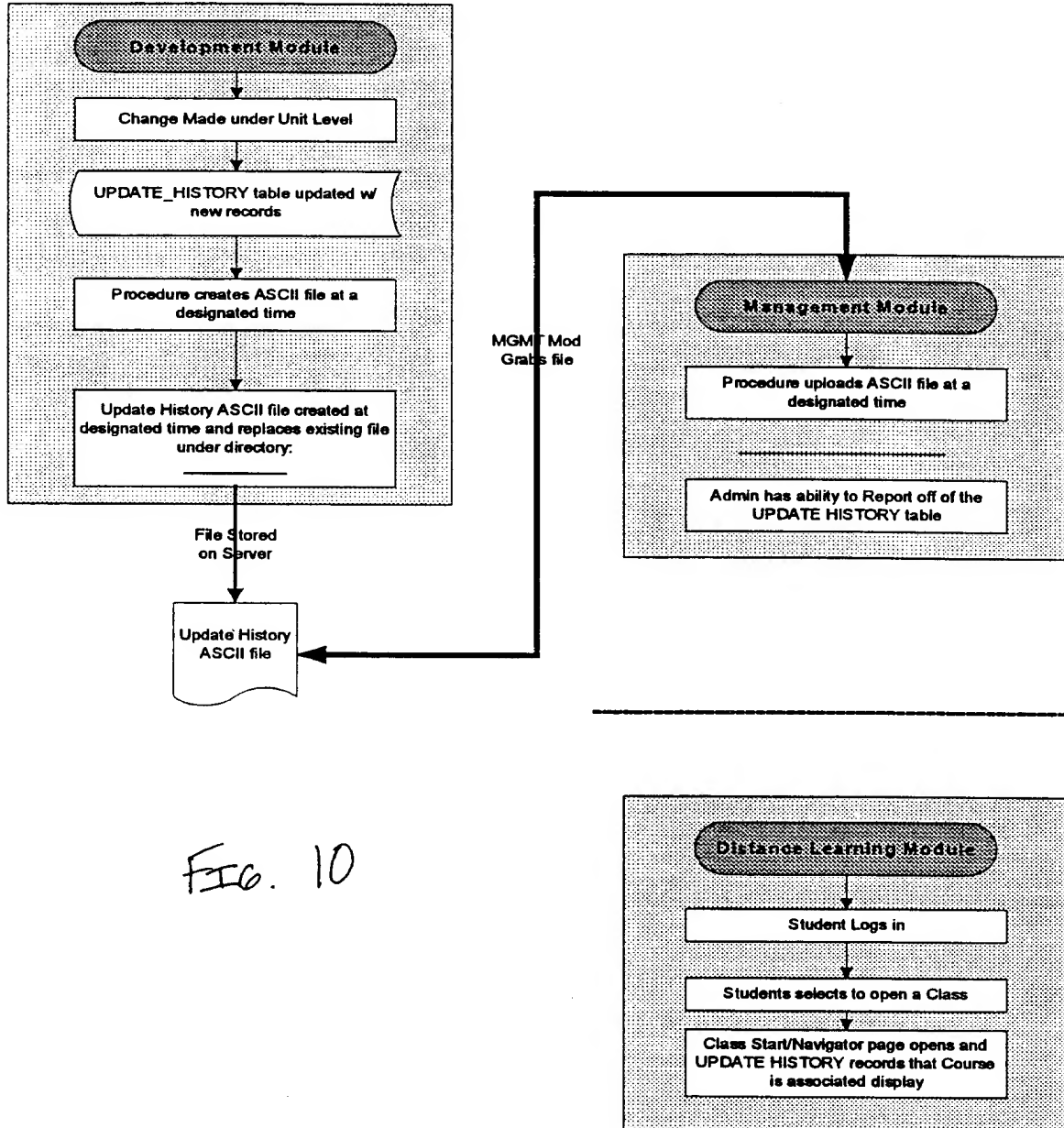


FIG. 10

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Database Modeling*New Tables and Fields (Mgmt and Development Module)**Management Module inherits these fields from the Development Module*

UPDATE HISTORY			
Field	Data	Description	Default Value
Update Rec ID	N		
UnitID	N		
CompetencyID	N		
Object Level	A		In Table but probably not necessary
Associated Course	A		List of all associated courses.
Version number	N		
Header	A		
Change desc	A		
Author	A		
Date_Created	D		Do we want an additional field to exist for the Mgmt module that captures the date these records were imported?
Date Modified	D		
Effective date	D		
Exp Date	D		
Priority	N		Must Review, Important, General Knowledge, Minor Process change

FIG. 11

DEVELOPMENT MODULE Changes

Screen Example

FIG. 12

Agilent Archive - Change Summary

Change Summary

Changes have been made this Competency therefore changing the shared Unit that its associated with. These changes are recorded for Reporting Purposes and to keep our employees/students updated with the most current information.

Notes: Select CANCEL if the changes made were not critical or does not impact an employees ability to perform his/her job

Competency change: CompetencyID + Competency Statement

Unit: UnitID + Unit Title

Content Change Information

Priority	
Change Header	#Name?
Description of Change	
Author	dca
Effective Date	
Expiration Date	

Update Unit Version No. 1 Update

Associated Courses

The SQL statment here should find all CourseID_Course_Titles associated with the UnitID that has changed

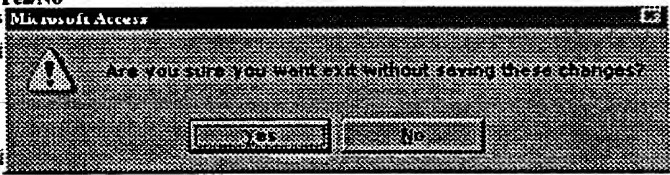
Courses to Re-Publish as a result of change

Would you like to update the Course Version Number for the associated courses as well? ☒ Yes ☐ No

Save Cancel

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Data Elements

Element Name	Control/Field Type	Description/Result/Default
Change Summary	Label and Notes	
Competency Changes:	Text field	Display - Concatenate Competency and Competency Statement
Unit:	Text field	Display - Concatenate UnitID & Unit Title
Priority*	Combo Box	Editable - UPDATE_HISTORY.priority
		Combo Box SQL - SELECT Name FROM Definition WHERE type='Update Priority'
Change Header*	Text field	Editable - UPDATE_HISTORY.header
Description of Change	Text - Memo	Editable - UPDATE_HISTORY.change_desc
Author*	Text	Editable - UPDATE_HISTORY.author
Effective Date	Text	Editable - UPDATE_HISTORY.effective_date
Expiration Date	Text	Editable - UPDATE_HISTORY.exp_date
Update Unit Version No?	Label & Text	Editable - UNIT.version
Update	Command Button	Capture Unit.version and Increments value + .1 and stores information in UNIT.version and UPDATE_HISTORY.version_number (change UPDATE_HISTORY.version_number to reflect UNIT.version field) *May need to change Version data type to Number
Associated Courses	List Box/SubReport	Query of all courses associated with the Unit.
Would you like.....	Radio Button	Yes - Increments COURSE.version for every course associated to unit by .1 when SAVE button selected. No - No action taken when SAVE button selected *May need to change Version data type to Number
SAVE	Command button	Save information to UPDATE_HISTORY table.
CANCEL	Command Button	Displays Message: 'Are you sure you DO NOT want to record these changes' Yes/No  YES - Closes screen and does not enter a record into UPDATE_HISTORY table. Returns user to UNIT Screen NO- Returns to Competency Screen. A Close Event or selection of SAVE/CLOSE reopens Change Summary Interface.

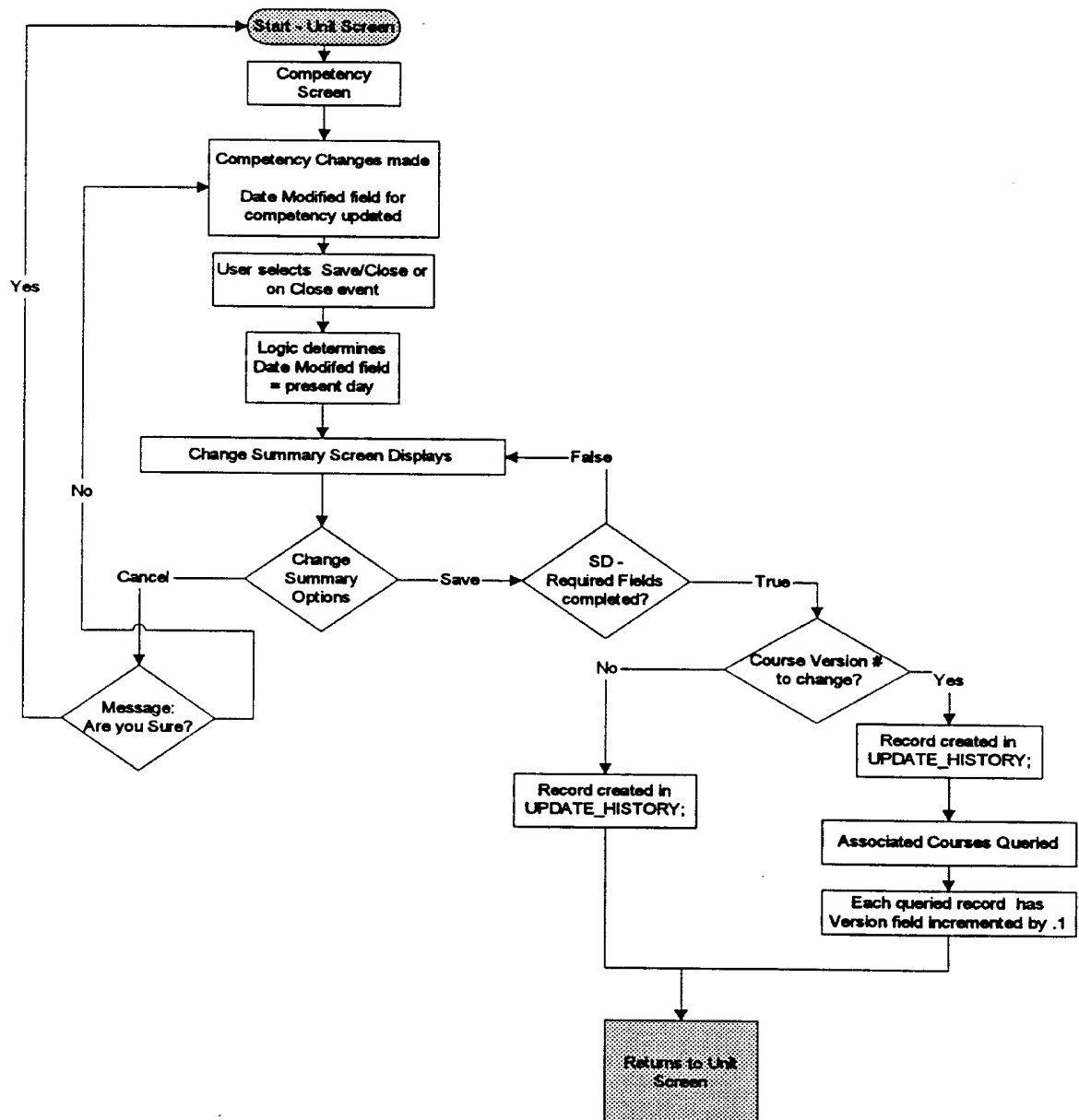
*Required

FIG. 13

Development Module Workflow

FIG. 14

Update Center Development Module Process



Functionality

This screen is used to record any changes that the Course Developer makes to a UNIT. The changes are recorded when a Competency has changed but the change is reflected for an entire unit.

It is a Course Developer's responsibility to Re-Publish any courses that were changed because a Unit associated with the course changed. Currently, if a unit is changed, every course associated with that Unit needs to be Re-published so the changes are reflected for each Course.

Exception Handling

FIG. 15

Event	What to do	Message
If the user selects the SAVE button and not all required fields are completed	Message	All Required fields must be completed

MANAGEMENT MODULE Changes

FIG. 16

The following data fields have been added to the management module database:

Element Name	Control/Field Type	Description/Result/Default
Change Summary	Label and Notes	
Competency Changes:	Text field	Display - Concatenate Competency and Competency Statement
Unit:	Text field	Display - Concatenate UnitID & Unit Title
Priority*	Combo Box	Editable - UPDATE_HISTORY.priority Combo Box SQL - SELECT Name FROM Definition WHERE type='Update Priority'
Change Header*	Text field	Editable - UPDATE_HISTORY.header
Description of Change	Text - Memo	Editable - UPDATE_HISTORY.change_desc
Author*	Text	Editable - UPDATE_HISTORY.author
Effective Date	Text	Editable - UPDATE_HISTORY.effective_date
Expiration Date	Text	Editable - UPDATE_HISTORY.exp_date
Update Unit Version No?	Label & Text	Editable - UNIT.version
Update	Command Button	Capture Unit.version and increments value + .1 and stores information in UNIT.version and UPDATE_HISTORY.version_number (change UPDATE_HISTORY.version_number to reflect UNIT.version field) *May need to change Version data type to Number
Associated Courses	List Box/SubReport	Query of all courses associated with the Unit.

DISTANCE LEARNING MODULE Changes

User's access the change summary records through the Navigation Page. The HTML body of the Start page displays any changes/records for which that CourseID is associated.

The fields that should display are:

Unit Title
 Priority
 Header
 Change_Desc.
 Author
 Date_Created
 Effective Date (if applicable)
 Exp_Date (if applicable)

FIG. 17

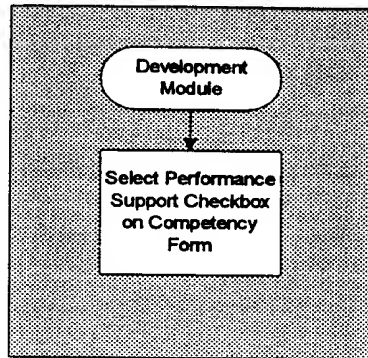
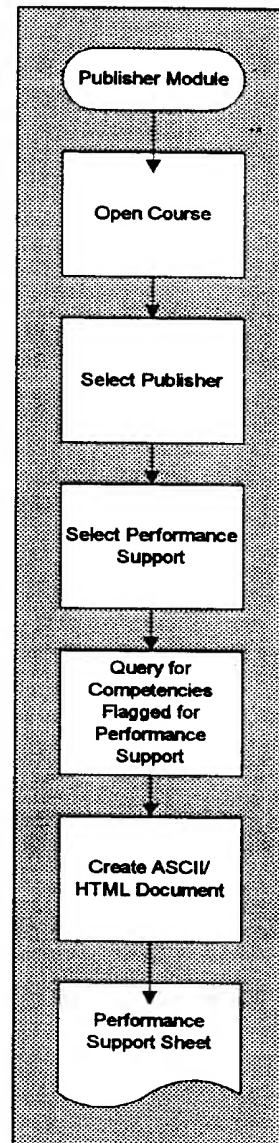
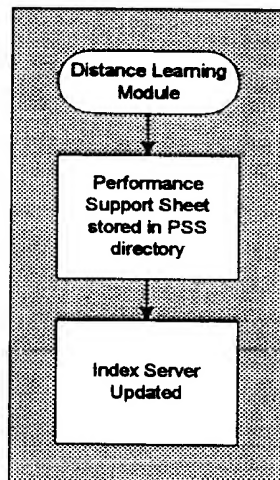
High Level User Workflow

FIG. 18



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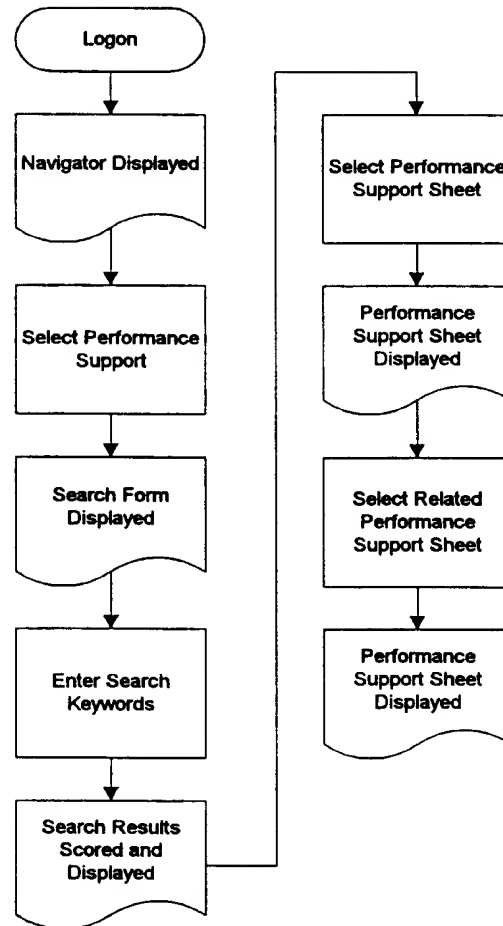
DISTANCE LEARNING MODULE Workflow

FIG. 19

DEVELOPMENT MODULE

Competency

Change Control Procedures

Competency Record ID: A1-C-2740 Linked to Unit A1-U-898 Change Link

Statement: Change Control Procedures

Sequence #	Performance Verb	Domain	Level
1	Describe	Cognitive	Comprehension

Description:

Performance Support ☒ Yes

Inductive Debrief ☒ Yes

Self Debrief ☒ Yes

Distance Learning ☒ Yes

Practical Application ☒ Yes

Performance Test ☒ Yes

Written Test ☒ Yes

Document ☒ Yes

Cancel Previous Next Delete Save Save/Close

Created: 12/15/00 Modified: 12/15/00

FIG. 20

Database Modeling

Tables and Fields (Development Module)

Management Module inherits these fields from the Development Module

Performance Support Sheet (Web)			
Field	Data	Description	Default Value
Rec ID	N		
UnitID	N		
CompetencyID	N		
Object Level	A		In Table but probably not necessary
Associated Course	A		List of all associated courses.
Version number	N		
Competency Title	A		
Competency Description	A		
Competency Type	A		
Competency Notice	A		
Competency Caution	A		
Competency Warning	A		
Element Title	A		
Element Description	A		
Element Notice	A		
Element Caution	A		
Element Warning	A		
Media Caption	A		
Media BLOB	B		
Media HTML	B		
Author	A		
Date_Created	D		Do we want an additional field to exist for the Mgmt module that captures the date these records were imported?
Date Modified	D		
Effective date	D		
Exp Date	D		
Priority	N		Must Review, Important, General Knowledge, Minor Process change

FIG. 21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/28762**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G09B 3/00, 7/00, 19/00

US CL :434/118, 322, 323, 362

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 434/118, 322, 323, 362

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

search terms: training, learning, development, objects, database, curriculum, publisher, web, testing, tailored, record

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,890,911 A (<i>GRISWOLD et al.</i>) 06 April 1999	NONE
A	US 5,904,485 A (<i>SIEFERT</i>) 18 May 1999	NONE

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

31 JANUARY 2001

Date of mailing of the international search report

15 FEB 2001

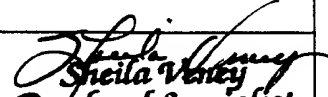
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Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

John Rovnak

Telephone No. (703) 308-3087


Paralegal Specialist
Technology Center 3700